NORTHWEST ARKANSAS
ENERGY & ENVIRONMENT INNOVATION PLAN
COMPREHENSIVE ACTION PLAN

DRAFT

FEBRUARY 2025

Prepared For :

Northwest Arkansas Regional Planning Commission
Springdale, Arkansas

Prepared By :

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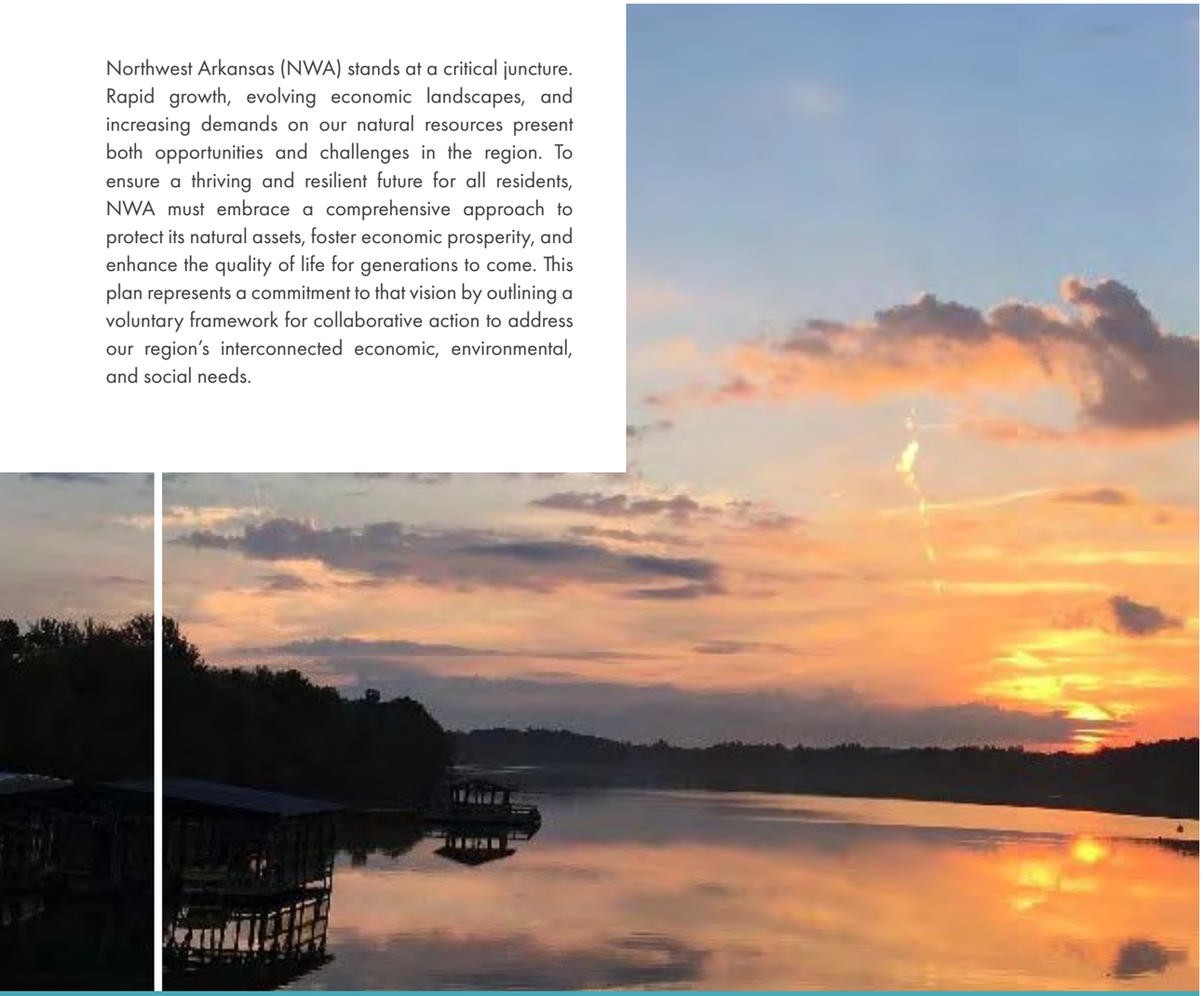
01

Introduction

Northwest Arkansas (NWA) stands at a critical juncture. Rapid growth, evolving economic landscapes, and increasing demands on our natural resources present both opportunities and challenges in the region. To ensure a thriving and resilient future for all residents, NWA must embrace a comprehensive approach to protect its natural assets, foster economic prosperity, and enhance the quality of life for generations to come. This plan represents a commitment to that vision by outlining a voluntary framework for collaborative action to address our region's interconnected economic, environmental, and social needs.



Objective

NWA currently faces interconnected challenges that threaten environmental health, economic prosperity, and quality of life. Rapid population growth and urbanization in the region requires a comprehensive, integrated approach to address these challenges and to ensure a resilient and thriving future for the region and its residents.

Transportation: Northwest Arkansas needs a broader range of transportation choices. Currently, an over-reliance on single-occupancy vehicles contributes to traffic congestion, air pollution, and greenhouse gas (GHG) emissions, while also limiting equitable access to opportunities. The region's transportation infrastructure struggles to accommodate population growth and evolving mobility needs, hindering economic development and impacting public health. Prioritizing and investing in diverse transportation options is crucial for addressing these challenges and creating a more sustainable and equitable transportation system.

Stormwater Management: Increased impervious surfaces as a result of development exacerbate stormwater runoff, leading to increased flooding, erosion, and pollution of our waterways. Existing infrastructure is often inadequate to handle the intensity and frequency of modern storms which results in property damage, compromised water quality, and threats to public safety. Current stormwater management practices often fail to capture the full potential for water reuse and green infrastructure implementation, and miss opportunities to enhance community resilience and ecological health.

Waste Management: The region's current waste management system relies heavily on landfills that are nearing capacity as the region's population continues to grow rapidly. Waste diversion rates remain low, and opportunities for waste reduction, reuse, and recycling are not fully realized. The lack of a comprehensive and accessible recycling and composting infrastructure limits community participation and hinders progress toward a circular economy.

Outdoor Recreation: The NWA region enjoys valuable natural resources that support a range of outdoor recreational activities, including mountain biking, hiking, hunting, and fishing. However, these resources are under increasing pressure from development, pollution, and overuse. Unplanned and sprawling development patterns can lead to habitat fragmentation and erosion. Furthermore, inadequate access to these natural areas limits opportunities for residents to connect with nature, improve their physical and mental well-being, and appreciate the region's ecological richness. Balancing the demand for outdoor recreation with the need to protect valuable ecosystems and ensure equitable access is crucial for the long-term health of our environment and our community.

Without a comprehensive plan that integrates strategies across multiple sectors to address these challenges, the NWA region will continue to experience negative environmental, economic, and social consequences. This Northwest Arkansas Energy and Environment Innovation Comprehensive Action Plan (NWA EEI CAP) seeks to address this issue by creating a roadmap for a more sustainable and resilient future for the region by providing a voluntary framework to guide and align efforts undertaken by local communities and organizations to maximize their impact. By providing a comprehensive set of strategies that communities and organizations in the region can use to address their specific needs and priorities, the NWA EEI CAP seeks to create high-quality jobs, spur economic growth, and enable access to and enhance NWA competitiveness for federal funding opportunities.

Background

The Northwest Arkansas Regional Planning Commission (NWARPC), the Metropolitan Planning Organization (MPO) for the Fayetteville-Springdale-Rogers, AR-MO Urban Area, is a voluntary organization consisting of local governmental units in Benton, Madison, and Washington counties. Formed in 1966 and designated an MPO in 1983, NWARPC facilitates regional transportation planning and prioritizes transportation system improvements. It fosters intergovernmental cooperation and long-range planning, which is often a prerequisite for federal funding. Member contributions, matched by federal and state grants, support multi-jurisdictional planning that meets local, state, and federal needs, and address regional challenges through collaboration and information sharing.

Rapid population growth and urbanization create regional challenges — from transportation to water, waste, and air quality — that transcend jurisdictional boundaries. Unaddressed, these interconnected issues threaten environmental quality, economic opportunities, public health, community well-being, and regional resilience. This plan recognizes these interconnected challenges and adopts a collaborative regional approach. Such collaboration, encompassing large-scale systems, leverages efficiencies and synergies beyond the reach of individual communities. Involving more than 30 towns and cities across three counties, regional collaboration maximizes impact and accelerates progress toward a shared vision of improved health, environment, economic opportunity, and community wealth.

Funded by the 2022 Inflation Reduction Act's Climate Pollution Reduction Grants (CPRG) program, the NWARPC, through an agreement with the Arkansas Department of Energy & Environment (ADEE) Division of Environmental Quality (DEQ), worked with Olsson to develop a comprehensive regional plan for the Metropolitan Statistical Area (MSA), including Benton, Washington, and Madison counties, to reduce GHG emissions and other harmful air pollutants in four phases (EPA 2024a) as follows:

- **Phase 1:** Development of a Priority Action Plan (PAP)
- **Phase 2:** CPRG Implementation Grant
- **Phase 3:** Development of a Comprehensive Action Plan (CAP)
- **Phase 4:** Submit Status Reports to the Environmental Protection Agency (EPA)

PAP: Developed through extensive collaboration across the NWA region, the PAP reflects the priorities of local residents, cities, businesses, and organizations to reduce GHG emissions and other harmful air pollutants. The PAP also advances one or more of the investment priorities identified by Governor Sanders (Page 4) and identifies the top priorities of the region to improve environmental quality while spurring innovation and economic development in NWA.

CPRG Implementation Grant: The adoption of the PAP by the NWARPC (Resolution No. 2024-10) on May 22, 2024 enabled a tri-region coalition consisting of NWARPC, Metroplan, and the City of Fort Smith to partner with more than 50 communities, agencies, and organizations across the state of Arkansas and apply for a competitive $100 million CPRG grant to fund previously planned projects and programs that would significantly improve active transportation, the environment, and quality of life for Arkansans throughout the state. With the support of the Arkansas Department of Energy and Environment and Arkansas' federal congressional delegation, the coalition's grant application was ultimately selected by the EPA in July 2024, providing a historic investment in the quality of life for Arkansans.

CAP: The CAP, also developed collaboratively with regional stakeholders and the public, builds on the PAP while incorporating new measures across additional sectors that reflect the priorities of the local residents, cities, businesses, and organizations. Like the PAP, the CAP advances Governor Sander's' investment priorities. The CAP offers an ambitious yet voluntary framework for achieving the region's shared goals and provides a crucial foundation for building long-term economic and environmental resilience by offering a clear road map for initiating actions that will enhance the sustainability of the region.

The CAP serves Benton, Madison, and Washington counties and is intended to be used by stakeholders, policymakers, private businesses, and members of the public interested in improving environmental quality, public health, and economic opportunities in the region. The voluntary measures and GHG reduction targets included in the CAP provide a regional framework that enables local communities and organizations to pursue grants and implement projects that are aligned with regional and state priorities to protect the quality of life of Arkansans.

Arkansas Investment Priorities

Facilitating Statewide Economic Growth and Competitiveness

Growing and expanding the economy with Arkansas by increasing access to economic opportunities for communities, advancing **transportation** and **commerce**, and maintaining a **resilient supply chain**.

Keeping Communities Safe

Improving public and **transportation safety** provisions through promoting road and highway **safety education** and training programs, strengthening **cybersecurity** infrastructure, and making safety improvements to roads and bridges.

Preparing the Infrastructure Workforce

Scaling up the workforce needed for project delivery, promoting access to **quality jobs**, and developing a **pipeline of talent** across the state.

Preservation and Promotion of The Natural State

Celebrating the State's natural resources to develop, create, and sustain **outdoor recreation, business, and employment** opportunities through ecology initiatives, environmental **resiliency** projects, and **proper water management practices.**

Creating a Portfolio of Reliable, Efficient, and Secure Energy Options

Expanding affordable and **efficient energy** options available to Arkansans through resources development while maintaining a strong **energy workforce** and **secure** electric power grid that can withstand emergencies and severe weather.

Overview of Plan Structure

The NWA EEI CAP aligns with Governor Sanders' investment priorities and outlines nine regional measures across seven sectors to reduce GHG emissions; it prioritizes low-income and disadvantaged communities (LIDACs) and robust stakeholder and public engagement. The plan is structured as follows:

LIDAC Summary: Based on the EPA's Climate and Economic Justice Screening Tool (CEJST), this section identifies and describes LIDACs in NWA and highlights their socioeconomic and environmental vulnerabilities. This analysis informed the development of the plan's measures. (See **Section 2** and **Appendix A** for supporting information.)

Stakeholder and Public Engagement: Recognizing that successful implementation requires collaborative regional and local action, this section details the public engagement process, with a focus on meaningful engagement with LIDACs, as mandated by the CPRG program. Engagement efforts spanned Madison, Washington, and Benton Counties. (See **Section 3** and **Appendix B** for supporting information.)

GHG Emissions Inventory: This section presents a comprehensive inventory of GHG emissions in NWA that is based on city, county, and state data. It establishes a baseline for future evaluation and includes a proposed pathway to reduce GHG emissions for each sector to reach net-zero by 2050. (See **Section 4** and **Appendix C** for supporting information.)

GHG Projections and Reduction Targets: This section outlines the region's path to net-zero GHG emissions by 2050. Based on the emissions inventory, it projects emission reductions across sectors, demonstrating the impact of proposed measures and detailing voluntary, measurable targets for key GHGs. A reduction pathway model illustrates the scale of change needed and each sector's contribution. (See **Section 5** for supporting information.)

GHG Reduction Measures: This section details voluntary measures across seven sectors — energy, transportation, industrial, buildings, waste, agriculture, and carbon removal — to achieve regional emissions reduction targets. Each sector strategy outlines concrete actions implemented through policies, incentives, partnerships, and community engagement. Prioritizing actions with multiple benefits, such as improved air quality and economic development, the plan provides for each measure: rationale, estimated GHG and co-pollutant impact, implementation authority, workforce needs, and benefits to LIDACs. This comprehensive approach ensures coordinated emissions reductions across NWA. (See **Section 6** for supporting information.)

Co-benefits for NWA: Beyond GHG reduction, the NWA EEI CAP will deliver numerous co-benefits, enhancing quality of life in NWA. These benefits include improved air and water quality that lead to better public health; local job creation and economic growth through investments in clean energy; enhanced mobility and reduced congestion via sustainable transportation options; and resource conservation and a more circular economy through waste reduction initiatives. These diverse benefits underscore the plan's potential to create a more vibrant, healthy, and resilient region. (See **Section 7** for supporting information.)

Nature-based Solutions Geographic Information System (GIS) Mapping Tool: This section discusses the Nature-based Solutions GIS Mapping Tool that is intended to serve as a resource for identifying important natural infrastructure and green corridors to form the backbone of a regional active transportation network. This interactive platform allows users to visualize and analyze data related to existing natural assets, such as forests, wetlands, waterways, and other ecologically valuable areas, to foster collaboration among stakeholders and promote a coordinated approach to natural resource management and transportation planning. (See **Section 8** and **Appendix E** for supporting information.)

02

Low-Income & Disadvantaged Communities

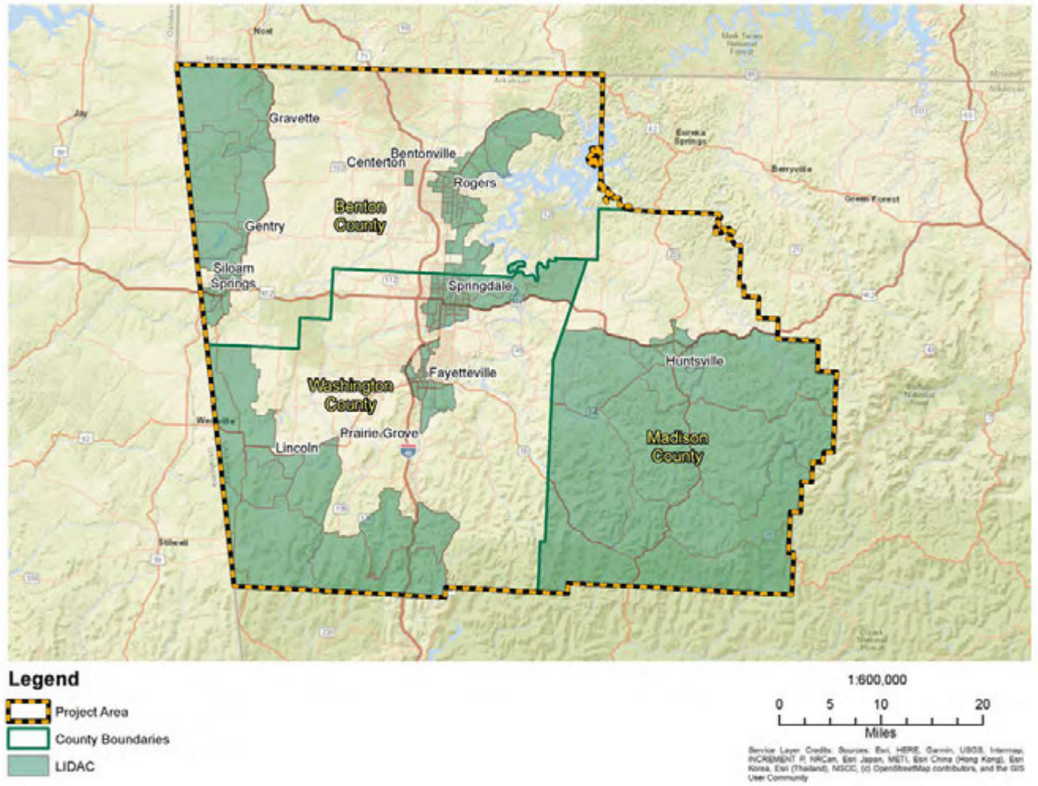
The NWA region is made up of diverse communities with varying socioeconomic backgrounds in urban, suburban, and rural areas. Within this region, low-income and disadvantaged communities (LIDACs) have been pinpointed at the census tract and block group levels using the EPA's Climate and Economic Justice Screening Tool (CEJST; USCEQ 2010) and the environmental justice screening tool (EJScreen) tool. The LIDAC Summary in **Appendix A** presents the outcomes of an analysis conducted on the CEJST and EJScreen data. The purpose of this analysis was to identify communities categorized as LIDAC as part of the planning initiative for the EPA's CPRG program – a climate action planning process where the EPA recognizes these communities as low-income and disadvantaged.

The CEJST serves as a geospatial mapping tool specifically designed to identify marginalized and overburdened communities facing pollution and insufficient investment. The tool assists policymakers, researchers, and organizations in identifying areas where vulnerable populations endure disproportionate environmental and economic burdens. Census tracts are classified through the CEJST as disadvantaged, partially disadvantaged, or not disadvantaged. Any census tract identified as disadvantaged by the CEJST is defined as a LIDAC. The CEJST evaluates various burden categories to determine community disadvantage, using different indicators as data points or measurements for assessing environmental and social conditions. Communities within a census tract are considered disadvantaged if they rank at or above the 90th percentile for one or more burden indicators and meet the threshold for the associated socioeconomic burden in each category.

EJScreen is an online mapping and screening tool developed by the EPA to help identify areas in the U.S. that may be disproportionately burdened by environmental justice concerns like pollution and other stressors. This tool summarizes socioeconomic and environmental indicators of disadvantage identified at the census block group level for a selected location and can compare these indicators to the rest of the state, EPA region, or nation. Each census block group is assigned a percentile score for environmental or socioeconomic indicators of disadvantage that is based on the percent of the population in that block group that has an equal or higher value when compared to other block groups in the state, EPA region, or nation. Any census block group identified by EJScreen as at or above the 80th percentile for one or more environmental or socioeconomic indicators of disadvantage is defined as disadvantaged for the purposes of this analysis.

Overall, there are 315 census block groups in the NWA region; 122 block groups, or 39 percent, are identified as disadvantaged as defined by EJScreen. **Figure 1** shows a map of Benton, Madison, and Washington counties; darker coloring indicates LIDACs. During data analysis, certain trends emerged on the county level. In Madison County, all LIDAC tracts surpass the threshold for four or more burden indicators; in Washington County, only 13 percent of LIDACs meet or exceed the threshold for four or more burden indicators as defined by the CEJST. However, in Washington County, 54 percent of LIDACs meet or exceed the threshold for two or three burden indicators as defined by the CEJST. The CPRG program requires a LIDAC analysis, the results of which are to be considered when developing and implementing measures in order to ensure that measures benefit LIDACs. See the LIDAC Summary in **Appendix A** for more information regarding burden indicators, further analysis, and comparisons within the NWA region.

Figure 1. Low-income and Disadvantaged Communities (LIDACs) in Northwest Arkansas (USCEQ 2010).



03

Stakeholder & Public Engagement

The NWARPC acknowledges that active stakeholder involvement and public engagement are essential to the planning process and key to understanding the regional priorities for the CAP. In addition to the following summary, **Appendix B** details the specific efforts undertaken by the NWARPC to engage stakeholders and the public throughout the development of this work.

Diverse marketing and outreach strategies were created and deployed during the engagement process, encompassing email communications, boosted and unboosted social media posts, press releases, posters, flyers, and a dedicated project webpage that is regularly updated and available in English, Spanish, and Marshallese. Additionally, the project team actively participated in events to enhance the project's visibility and reach within the community.

In coordination with the consultant team, the NWARPC identified potential members for the stakeholder committee. These members were identified because of their ability to implement the identified comprehensive action items. The NWARPC worked to provide representation from a variety of sectors.

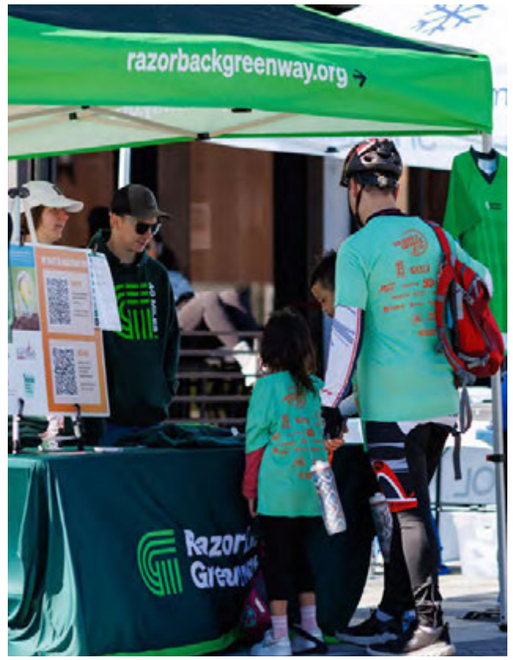
To assist in the adaptation of the CAP, virtual stakeholder committee meetings were held on July 17, August 21, and November 6, 2024, and on February 12, 2025. The meeting format included a welcome and brief introduction of the project team and a presentation of the project and proposed measures. Stakeholder poll question exercises were interspersed throughout the presentations and stakeholders were able to provide input and feedback through surveys that were emailed after the meetings.

Additionally, two public open houses were held on September 17, and September 19, 2024, to present information to the public and gather input on preferred measures via the public survey. The public was invited to attend via email, website information, and boosted social media posts. All open house materials were posted to the project website following the open houses. Marshallese and Spanish interpreters were available in Springdale to accommodate the unique local population's language needs. Public feedback was gathered via the public survey and idea box in English, Marshallese, and Spanish. Attendees for stakeholder committee meetings and public open houses included representatives from public, nonprofit, and private sectors.

Special emphasis was placed on engaging with LIDACs throughout the public participation process to carry out meaningful engagement with the affected LIDACs in the creation of the measures outlined in this plan. NWARPC took a targeted approach to engagement with LIDACs within Madison, Washington, and Benton counties after the LIDAC identification and analysis task was completed. A LIDAC focus group was organized and a meeting was convened on December 5, 2024 to discuss the proposed measures and solicit feedback on how these measures will benefit or impact LIDACs of NWA, and any additional considerations that should be made regarding the measures and LIDACs.

A corporate stakeholder committee was organized and a meeting was convened on December 6, 2024 to discuss the sustainability plans of some of the largest employers in NWA and to solicit feedback on how the measures outlined in this CAP support or align with those plans, and to identify any gaps or other considerations that are needed to assure alignment between the CAP and the sustainability plans of these corporations.

For more detailed information on the engagement activities, please refer to **Appendix B**.



04

Greenhouse Gas Emission Sources & Sinks in Northwest Arkansas

GHG emissions include carbon dioxide (CO2), nitrous oxide (NO2), methane (CH4), and fluorinated gases (F-gases). GHG emissions data is often collected and reported at various administrative levels, including national, regional, and sometimes state or local levels. The NWA region includes Benton, Madison, and Washington counties. It is understood that there are inevitable uncertainties with the estimation process, but it is also recognized that this regional inventory has been reinforced and compared with data from multiple reliable sources. In addition to the following summary, details about the GHG emission and sink inventory can be found in **Appendix C**.

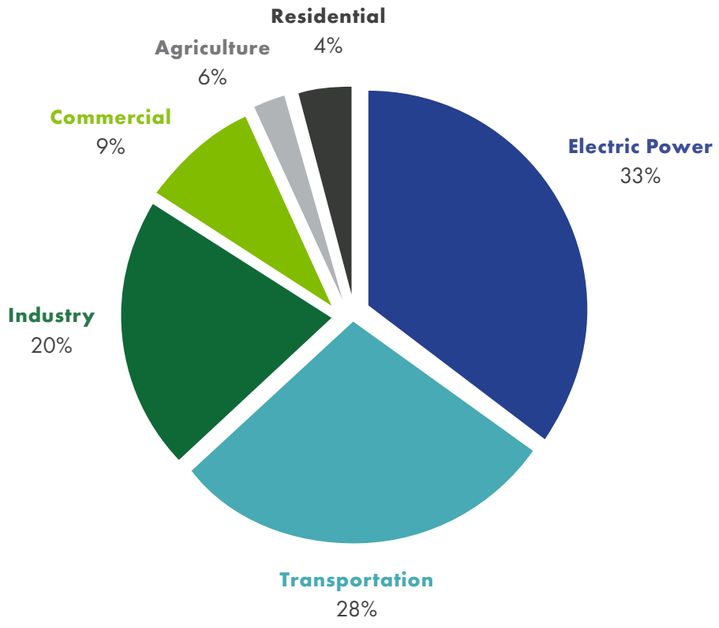
Greenhouse Gas Emission Sources in Northwest Arkansas

The NWA GHG emissions regional inventory approximated a total of 8,781,347 metric tons of CO2 for the year 2020. This amount was broken up into the following sectors: electric power, transportation, industry, commercial, residential, and agriculture. The percentages of emissions broken down by sector are shown in **Figure 2**.

The electric power, transportation, and industry sectors are the largest sources of GHG emissions in the region, accounting for approximately 81 percent or 7,145,958 metric tons of the region's GHG emissions.

Figure 2. Percentages of Greenhouse Gas Emissions in Northwest Arkansas by Sector

(City of Fayetteville staff 2023; EPA 2020a; EPA 2020b; Google 2020).



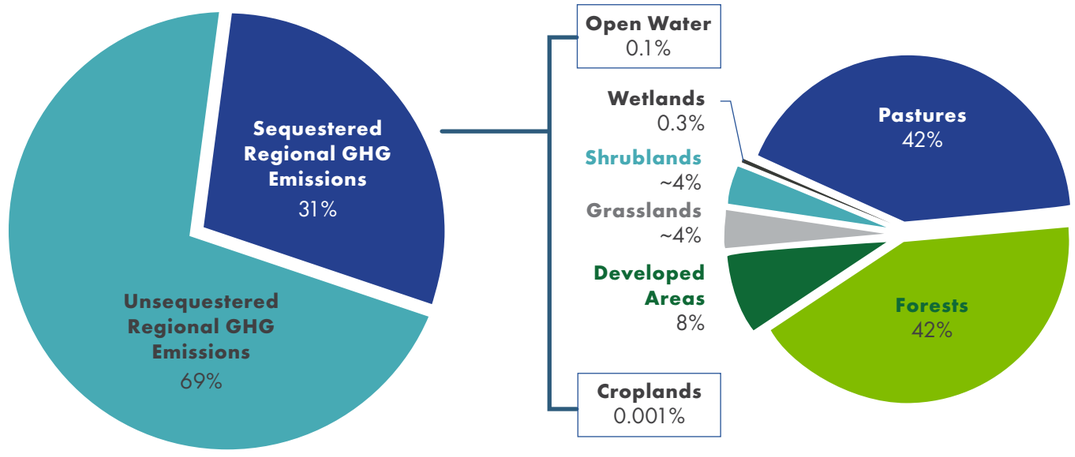
Greenhouse Gas Sinks in Northwest Arkansas

In addition, it was found that approximately 2,677,944 metric tons of CO2 were sequestered in NWA in 2020. Most of the carbon is sequestered in the biomass and soils of forests (42 percent) and pastures (42 percent). The carbon sequestered by these land cover categories in NWA account for approximately 8 percent of total carbon sequestration in the state of Arkansas. The estimated carbon sequestration provided by each land cover category is listed in **Table 1**, and the percentages of the total carbon sequestration for each land cover category are shown in **Figure 3**.

Table 1. Carbon Dioxide Sequestration in Northwest Arkansas by Land Cover Type in 2020.

Land Cover Category	Estimated Metric Tons of CO2 Sequestered in 2020
Grasslands	107,886
Pastures	1,124,608
Forests	1,132,069
Shrublands	98,388
Wetlands	6,698
Open Water	1,457
Croplands	28
Developed Areas	206,810
Total	2,677,944

Figure 3. Percentages of Carbon Sequestration in Northwest Arkansas by Land Cover Category.



05

Greenhouse Gas Projections & Reduction Targets

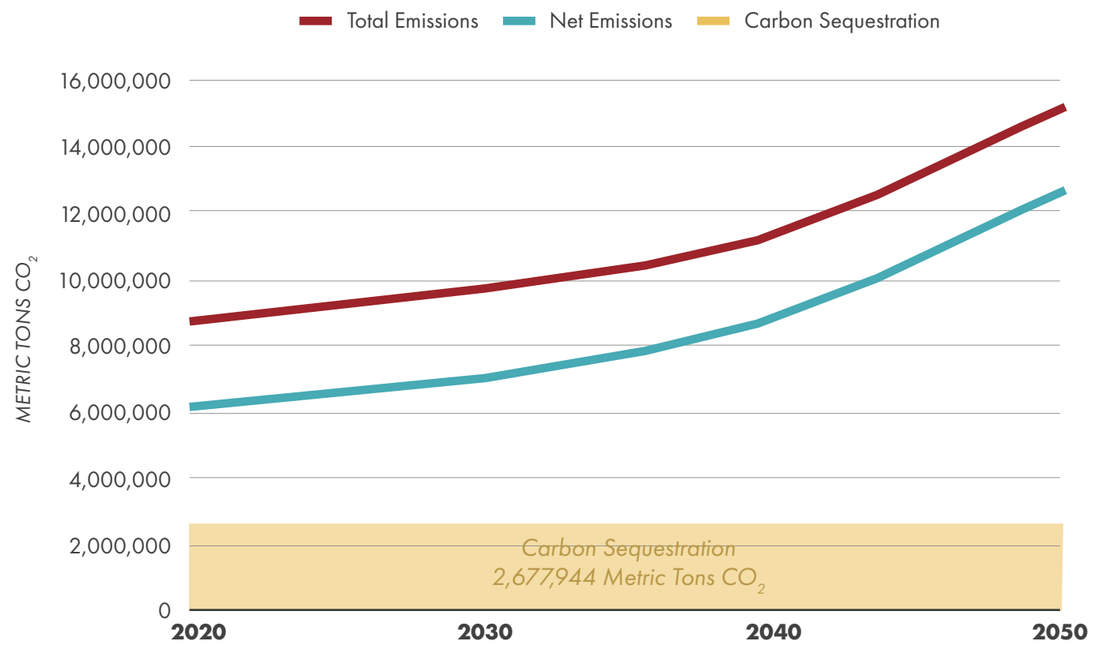
This CAP aims to reduce GHG emissions from various sectors, including energy, transportation, and industry, and support similar net-zero goals of other organizations in the region, including Tyson Foods, Walmart, the City of Fayetteville, and the University of Arkansas. Achieving net-zero GHG emissions can not only benefit the environment, but also stimulate economic growth and innovation through the creation of new jobs, the development of new industries, and increased energy security.

Projected Greenhouse Gas Emissions in Northwest Arkansas

To understand the full extent of the challenge facing NWA, it is crucial to examine the projected GHG emissions if no action were taken to reduce these emissions while the population continues to rise.

Assuming no broader technological advancements occur, and business practices continue as usual over the next 25 years, GHG emissions in NWA would be expected to double over the baseline year of 2020, reaching 16,720,291 metric tons of CO2 a year by 2050 (see **Figure 4**). Carbon sequestration rates would be expected to decrease slightly to 96 percent of the baseline year of 2020, assuming a worst-case scenario for urban sprawl to accommodate the projected population growth.

Figure 4. Greenhouse Gas Emission Projections with No Reduction Measures.



Regional Greenhouse Gas Emission Reduction Targets

To assure a healthy and resilient future for the region, this plan has set ambitious GHG reduction targets. These voluntary targets, aligned with state and regional goals, aim to reduce emissions from various sectors including energy, transportation, and industry. Achieving these goals will require significant investments in clean energy technologies, energy-efficiency measures, and sustainable land use practices.

By setting clear and measurable targets, the region can track progress, incentivize sustainable practices, and attract investments into the region. **Figure 5** shows proposed decennial GHG reduction targets for each sector covered in this plan. Refer to **Table 2** (Page 21) for reduction specifics. These sector-based targets are voluntary and are meant to be used as a planning tool to set the region up for success as it works toward reaching net-zero GHG emissions by 2050. This GHG reduction pathway is depicted below.

Figure 5. Proposed Greenhouse Gas Emission Reduction Targets by Sector.

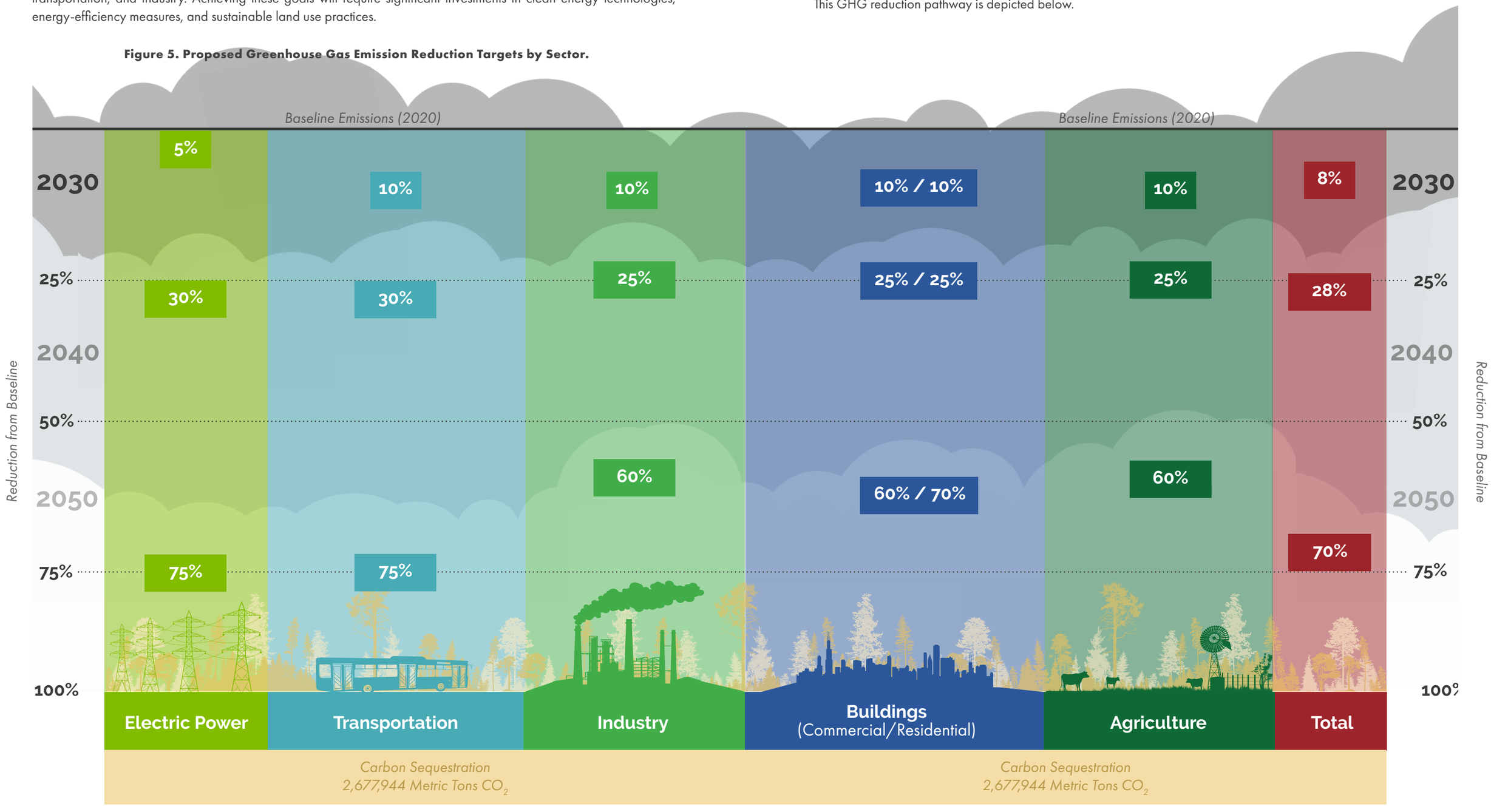
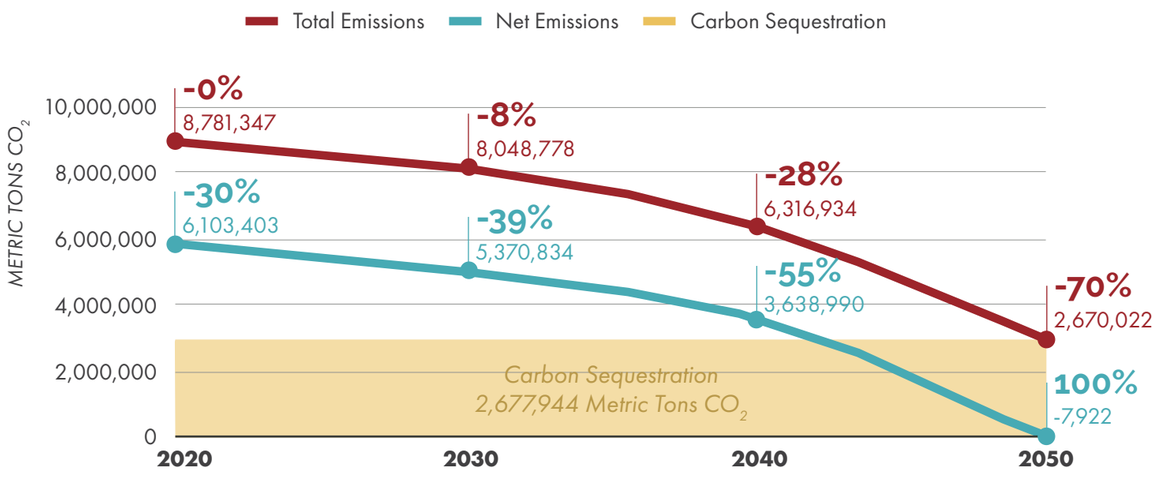


Table 2. Proposed Decennial Greenhouse Gas Reduction Targets by Sector
(Metric Tons of Carbon Dioxide)

Sector	2020	2030	2040	2050
Electric Power	2,911,316	2,765,750	2,037,921	727,829
	% reduction from 2020	5%	30%	75%
Transportation	2,470,208	2,223,187	1,729,146	617,552
	% reduction from 2020	10%	30%	75%
Industry	1,764,434	1,587,991	1,323,326	705,774
	% reduction from 2020	10%	25%	60%
Commercial	793,995	714,596	595,496	317,598
	% reduction from 2020	10%	25%	60%
Residential	352,887	317,598	264,665	105,866
	% reduction from 2020	10%	25%	70%
Agriculture	488,507	439,656	366,380	195,403
	% reduction from 2020	10%	25%	60%
Total Emissions	8,781,347	8,048,778	6,316,934	2,670,022
	Total % Reduction	**8%**	**28%**	**70%**

Figure 6. Proposed Greenhouse Gas Emission Reduction and Carbon Sequestration Targets from 2020 Levels.



The Path to Net Zero

Net zero is the goal of achieving a balance between the amount of GHG released into the atmosphere and the amount removed. This approach is important because of the difficulty of reducing all emissions to zero within the timescale needed. However, to be effective, net-zero GHG emissions must be permanent, preventing the release of stored GHG through incidents such as deforestation or carbon leakage.

Achieving net-zero GHG emissions will require a two-pronged approach: 1) significantly reducing emissions and 2) enhancing natural carbon sequestration. The most significant reduction in GHG emissions will need to occur in the energy, transportation, and industrial sectors.

Though technological advancements and renewable energy sources are crucial, harnessing the natural landscape's ability to store carbon is also important. Forests and soils act as natural carbon sinks, absorbing and storing CO2 from the atmosphere. By protecting and restoring these ecosystems, we can increase their carbon sequestration potential and minimize emissions from these ecosystems. Additionally, sustainable land management practices, such as reforestation, prairie restoration, and improved soil health can further enhance carbon storage. These natural solutions, when combined with emission reduction strategies, offer a powerful pathway toward reaching net-zero goals by 2050.

In addition to the widespread reduction in GHG emissions outlined in this plan, the region will also likely need to increase carbon removal. Land development and loss of carbon stocks in the region because of the rapidly growing population will present challenges to maintaining the natural carbon sequestration rates in the region so that it is consistent with 2020 levels. **Figure 6** shows proposed decennial net GHG emission targets accounting for carbon sequestration. This proposed pathway to net-zero emissions by 2050 is also depicted.

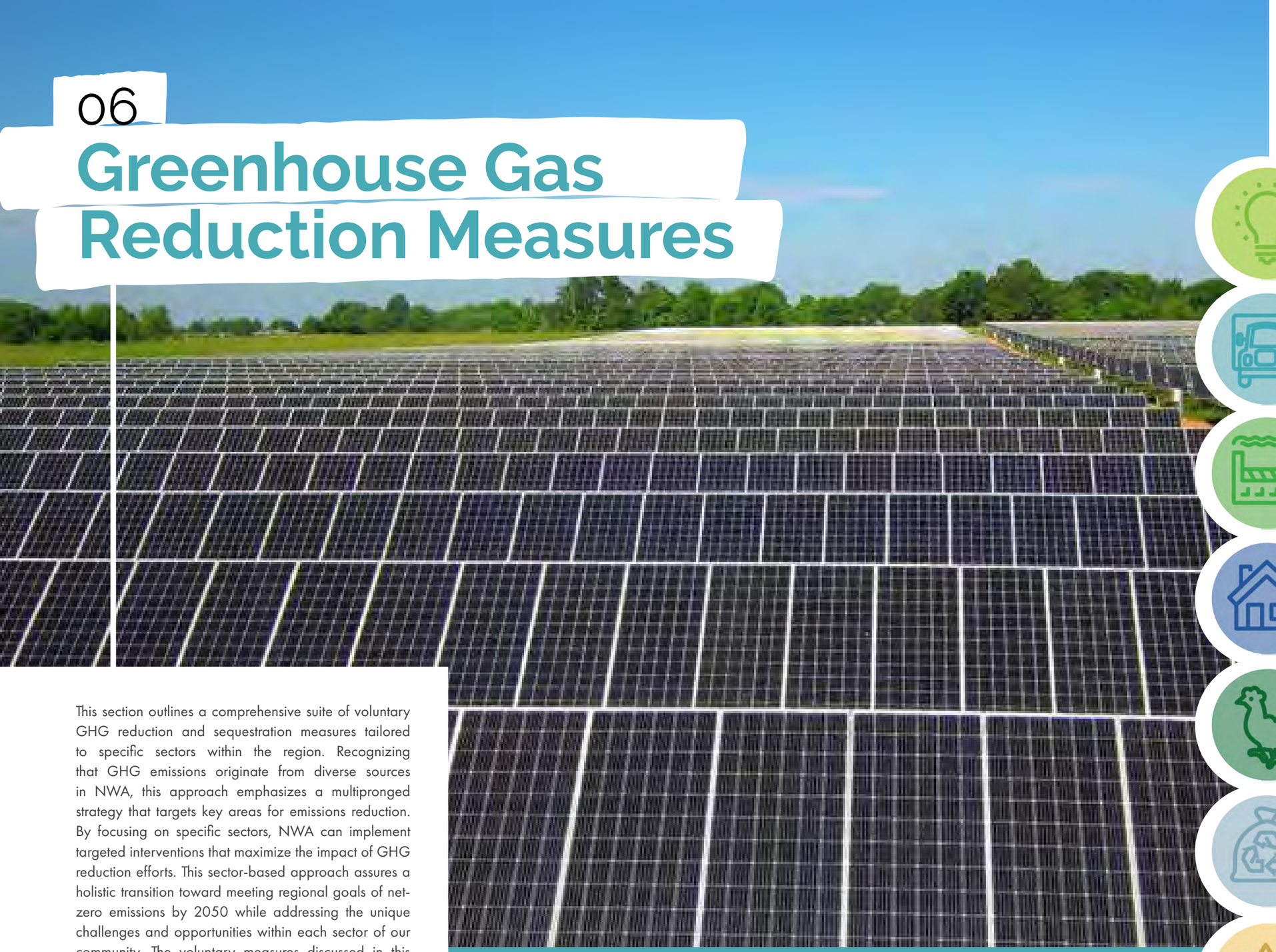
The implementation schedule shown in **Table 3** features key milestones to assure timely progress in achieving the GHG emissions reduction targets. This targeted, phased approach provides a clear pathway to achieve the region's sustainability goals, with both short-term and long-term milestones to reach substantial emission reductions by 2050.

Table 3. Key Milestones to Reach Net-zero Emissions by 2050

Year	Percent Reduction from 2020 Levels	Overall Goal
2025	-	• Establish baseline greenhouse gas (GHG) levels for reductions. • Build partnerships critical for a measure's success. • Obtain implementation authority where needed. • Launch measures and policy frameworks.
2030	8%	• Continue building partnerships in region. • Implement additional measures. Prioritize measures with greatest impact on GHG emissions. • Lay foundation for reaching 2040 and 2050 goals.
2040	28%	• Continue implementing measures. • Continue prioritizing measures with greatest impact on GHG emissions. • Make significant midterm progress toward 2050 goal.
2050	70%	• Achieve net-zero emissions for the region.

06

Greenhouse Gas Reduction Measures



This section outlines a comprehensive suite of voluntary GHG reduction and sequestration measures tailored to specific sectors within the region. Recognizing that GHG emissions originate from diverse sources in NWA, this approach emphasizes a multipronged strategy that targets key areas for emissions reduction. By focusing on specific sectors, NWA can implement targeted interventions that maximize the impact of GHG reduction efforts. This sector-based approach assures a holistic transition toward meeting regional goals of net-zero emissions by 2050 while addressing the unique challenges and opportunities within each sector of our community. The voluntary measures discussed in this section were developed through a prioritization process that involved stakeholders and the public.

Sectors

- Energy
- Transportation
- Industrial
- Buildings
- Agricultural
- Waste & Recycling
- Carbon Removal

Energy Sector

MOMENTUM MAKERS

- ***J.B. Hunt** constructed a 40-acre solar facility that will offset 80% of the power used at its Lowell campus.*
- ***Tyson Foods** aims for 50% renewable energy use in its U.S. operations by 2030.*
- ***Walmart** has set global renewable energy targets of 50% by 2025 and 100% by 2035.*

In 2020, the electric power sector in NWA was responsible for approximately 33 percent (2,911,316 metric tons) of the region's GHG emissions, primarily from electricity production used by other end-use sectors. Achieving the regional sustainability goals outlined in this plan will require a significant reduction of GHG emissions in the energy sector. **Table 4** shows a proposed GHG reduction pathway for this sector to support the regional goal of net-zero emissions by 2050.

The results of the public and stakeholder engagement and regional GHG analysis indicate that reducing GHG emissions in the energy sector could be achieved by the following measure:

Developing and implementing a regional renewable energy innovation program by:

1. **Installing renewable energy and energy storage systems on municipal/government facilities.**
2. **Developing distributed and community-scale renewable energy generation and storage, including in LIDACs and rural communities.**
3. **Developing and implementing programs that support smart-grid and/or behind-the-meter technologies.**

Table 4. Projected Percent Reduction of Carbon Dioxide Gases from Baseline Year

Year	Percent Reduction from 2020 Levels	Metric Tons CO_2 Emitted per Year
2020	Baseline	2,911,316
2030	5	2,765,750
2040	30	2,037,921
2050	75	727,829

Progress in this sector could be monitored with updated GHG emissions data or energy use data from local utilities.

RATIONALE FOR MEASURE

Considering that approximately 33 percent of the regional GHG emissions are from the energy sector, there is the potential for implementation of a regional energy innovation program that will have a significant impact in reducing GHG emissions. Though GHG emission reductions at all local utilities may not be feasible through the CRPG implementation grant program, public and private entities are pursuing, or are interested in pursuing, the installation of renewable energy and energy storage systems. Those interested include the public, including people in rural and LIDACs. During stakeholder engagement for the CPRG planning process, several local governments, regional organizations, and the University of Arkansas described ongoing, planned, or potential activities that could gain a critical path forward with grant funding. Utility portfolios in NWA consist primarily of fossil fuels, so there is an opportunity for government entities and public-private partnerships to drive GHG emission reduction efforts in the energy sector.

This measure is aligned with broader sustainability initiatives in the region. J.B. Hunt constructed a 40-acre solar facility to offset 80% of the power on its corporate campus in Lowell (J.B. Hunt 2025b). Tyson Foods is taking significant steps toward sustainability by pledging to power 50 percent of its domestic operations with renewable energy by 2030 (Tyson Foods 2022). Walmart has made even bolder commitments, aiming for 50 percent renewable energy at its facilities globally by 2025 and 100 percent by 2035 (Walmart 2023). The City of Fayetteville is also joining the movement, striving for 100 percent clean energy for government operations by 2030 and the entire community by 2050 (City of Fayetteville 2024).

Both the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) provide substantial funding for green energy project deployment. Programs such as the EPA's Solar for All and the Department of Energy's (DOE's) Grid Resilience and Innovation Partnerships (GRIP) programs provide grant support for developing and advancing clean energy generation and storage projects on public facilities and homes in LIDACs. The IRA's direct-pay provisions provide government entities with the ability to benefit from clean energy tax credits. Government entities that elect to use the direct-pay provision can treat the credit as a payment of tax with any overpayment resulting in a refund. Grant programs, coupled with the IRA's direct-pay provisions, allow green and renewable energy projects more feasibility without pursuing traditional debt financing mechanisms.

GHG AND CO-POLLUTANT EMISSIONS REDUCTION

Distributed power generation, though somewhat limited by state regulation, could significantly reduce the region's GHG emissions. As an example, Google's Environmental Insights tool estimates that the City of Fayetteville's buildings consume 943,000 tons of carbon dioxide equivalent (tCO2e) per year, and the City of Fayetteville's rooftop solar potential is 490,000 tCO2e per year (Google 2020). Though it may not be feasible or cost-effective to cover all rooftops with solar, such an analysis demonstrates the large potential upside with the comprehensive implementation of a program such as the one envisioned by this measure.

If 33 percent of current energy use could be replaced by zero carbon energy sources, the impact would be an overall reduction of regional GHG emissions of 10 percent. The GHG emissions reduction largely depends on the amount of funding that is available for implementation of the components contained within this measure. As an example of the potential, the City of Fayetteville increased clean energy use from 16 percent to 72 percent by installing solar power arrays near its two wastewater treatment facilities. In addition to GHG emissions reductions, other co-pollutant emission reductions would be realized for criteria and hazardous air pollutants, including a resultant positive impact from reduced ozone and particulate matters less than 2.5 microns in diameter (PM2.5) emissions and the associated health impacts of those emissions.

AUTHORITY TO IMPLEMENT

A renewable energy innovation program could extend incentives to several different entities. If an implementation grant is pursued for this measure, it is anticipated the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. This program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of this measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. Public-private partnerships could also be a mechanism to implement this measure. The state of Arkansas has regulations that affect generation, distribution, and net metering that would need to be evaluated and that could be a barrier to implementing this measure in certain instances and for certain projects.

ANTICIPATED WORKFORCE NEEDS

The renewable energy industry requires a diverse range of skills and expertise to design, develop, and operate these clean energy systems. Professionals who have backgrounds in engineering, project management, environmental science, and technical expertise are in high demand. Organizations that oversee program implementation will also have procurement and oversight responsibilities. In addition, field services will be needed to construct, install, operate, and maintain these systems.

Overall, implementation of this measure is anticipated to result in an increased demand for workers and an associated need for workforce development and training, which should have a positive impact on the economy in NWA. There are 54 programs across the IIJA and IRA that provide for green workforce development that include recruiting, training, and hiring workers. The IRA includes tax credits and other rebate programs to support energy-related workforce development activities. Through the IRA's direct-pay provision, the Department of the Treasury can provide tiered tax credits to public entities that include workforce development activities in their renewable energy projects, such as registered apprenticeships and meeting prevailing wage requirements. Additional federal funding proposals should consider partnering with local and regional institutions of higher education to advance on-the-job-training activities, such as registered apprenticeships, to take advantage of these tiered tax credits and advance both clean energy goals and workforce training targets.

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

A renewable energy innovation program would be structured in a manner that prioritizes incentives for LIDAC and rural populations. As noted through the stakeholder and public engagement process as part of CPRG planning activities, not all populations value GHG emission reduction efforts alike. For example, people in multifamily housing may evaluate the pros and cons of renewable energy installation for their building differently than someone in a rural community. But both population subgroups would likely appreciate such a project if lower cost, low- or no-carbon energy can be provided in a reliable manner. This program would be structured in a manner that meets the desires and needs of the population served and would focus on providing equitable outcomes with its incentive programs.

Generally, a reduction in GHG emissions from the energy sector can result in a reduction in local co-pollutant emissions, thereby having a positive (or reduced negative) impact on health outcomes that particularly benefits LIDACs that typically suffer the most in the local area. If localized renewable power generation can result in lower costs for customers, it will typically have a positive impact on LIDAC populations that are on fixed incomes.

Transportation Sector

MOMENTUM MAKERS

- ***Walmart*** *aims for 10% of its Bentonville workforce to bike to work and provides e-bikes to employees to encourage cycling.*
- ***J.B. Hunt*** *aims to cut carbon emissions by 32% from 2019 levels by 2034.*
- ***City of Fayetteville*** *targets 10% alternative fuel vehicles in its fleet by 2030.*

The results of the public and stakeholder engagement and regional GHG analysis indicate that reducing GHG emissions in the transportation sector could be achieved by reducing diesel-powered and gas-powered automobile trips and incentivizing efficient and low/zero emission modes of transportation through the following measures:

1. **Encouraging mode shift by expanding infrastructure such as bicycle facilities, transit stops, sidewalks, and other active transportation-supporting infrastructure.**
2. **Updating/adopting building and zoning codes and policies/ long-range plans to encourage walkable, bikeable, and transit-oriented development.**
3. **Incentivizing more efficient and lower/zero emission modes of transportation.**

Table 5.

Projected Percent Reduction of Carbon Dioxide from Baseline Year.

Year	Percent Reduction from 2020 Levels	Metric Tons CO_2 Emitted per Year
2020	Baseline	2,470,208
2030	10	2,223,187
2040	30	1,729,140
2050	75	617,552

Achieving regional sustainability goals outlined in this plan will require a significant reduction of GHG emissions in the transportation sector. **Table 5** shows a proposed GHG reduction pathway for this sector to support the regional goal of net-zero emissions by 2050.

Annual vehicle miles traveled (VMT) for Benton and Washington counties in 2019 were 4,608,084,120 miles (NWARPC 2021). According to the EPA, a typical passenger vehicle achieves approximately 22.2 miles per gallon, on average. For each gallon of gasoline burned, the EPA estimates 8,887 grams of CO2 is produced (USEPA 2024e). This results in approximately 1,844,687 metric tons of CO2 per year emitted from petroleum-fueled automobiles in these counties, or an average of 400 grams of CO2 per VMT. **Table 6** lists projected metric tons of CO2 emissions per year based on projected population growth if no actions were taken to increase clean energy in the transportation sector. These numbers assume that the average annual VMT per person in the region will remain constant through 2050.

These measures will be implemented primarily within the urban areas of Benton and Washington counties, where transportation-related emissions are highest. Progress in this sector could be monitored with updated GHG emissions data, by using metrics such as reductions in automobile VMT, and increases in low-emission transit use and active transportation facility use through regional bicycle and pedestrian traffic counters. The cost of implementing these measures varies by initiative.

Table 6.

Projected Annual Carbon Dioxide Emissions from Transportation Sector in Benton and Washington Counties with No Action.

Year	Metric Tons CO_2 Emitted per Year
2020	1,844,687
2030	2,284,871
2040	2,836,790
2050	3,512,411

Mode Shift

Encouraging transportation mode shift to reduce GHG emissions in the transportation sector can be accomplished through the following measure:

Expanding infrastructure such as bicycle facilities, transit stops, sidewalks, and other supporting infrastructure.

By promoting transportation choice and making active modes of transportation more accessible and safer, the NWA region aims to decrease dependency on diesel- and gas-powered vehicles, which will directly reduce GHG emissions. As the NWA region continues to be a national leader in the implementation of active transportation projects, the mode shift measure is expected to play a critical role in reducing transportation emissions, thereby contributing significantly to NWA's overall net-zero goal by 2050.

RATIONALE FOR MEASURE

Expanding opportunities for using alternative modes of transportation, including active transportation like walking, cycling, or other micromobility modes provides options for Arkansans, many of whom will choose a cleaner mode for travel. Specific initiatives that community members and stakeholders mentioned through the series of public engagement activities included infrastructure improvements like providing more bus stops with active transportation-friendly amenities to aid in their first and last mile linkages. Other initiatives mentioned were expanding the region's existing hard-surface trail network to expand access to more households and destinations and providing electric bicycle (e-bike) purchase incentives to enable residents to commute or make longer distance trips by bicycle.

Though the survey covered several transportation sector components that the NWA community is interested in, the regional need boiled down to enabling transportation choice by providing residents more options for travel throughout the region. Providing well-designed,

The Priority Action Plan (PAP) enabled the region to apply for CPRG Implementation Grant funding that was awarded to the following 18 projects in NWA that further the development of the NWA Green Network::

1. Razorback Greenway Corridor Stream and Riparian Restoration (Bella Vista),
2. Razorback Greenway and Town Branch Corridor Forest and Riparian Restoration (Bentonville),
3. River Commons Floodplain, Prairie, and Riparian Restoration and Trail Construction (Fayetteville),
4. Town Branch Corridor Stream and Riparian Restoration (Fayetteville),
5. University of Arkansas Oak Knoll Wetland, Prairie, Forest, Stream, and Riparian Restoration (Fayetteville),
6. University of Arkansas Oak Ridge Hillside Prairie and Forest Restoration and Trail Construction (Fayetteville),
7. University of Arkansas AR Research & Tech Park Floodplain, Prairie, and Forest Restoration (Fayetteville),
8. Clear Creek-Johnson Park Riparian, Prairie, & Forest Restoration (Johnson),
9. Puppy Creek Stream and Wetland Restoration and Preservation (Lowell),
10. Prairie Grove Battlefield State Park Wetland, Prairie, and Riparian Restoration (Prairie Grove),
11. Osage/Blossom Way Creeks Stream and Wetland Restoration, Preservation, and Trail Construction (Rogers),
12. Lower Clear Creek Stream Restoration and Preservation (Springdale),
13. Spring Creek at the Greenway Forest, Stream and Riparian Restoration and Preservation (Springdale),
14. Spring Creek at Downtown Preservation (Springdale),
15. Spring Creek at Thunder Chicken Wetland, Stream and Riparian Restoration and Preservation (Springdale),
16. Willie George Park Wetland Restoration (Springdale),
17. Springtown Reforestation Projects (Springtown),
18. West Fork White River Wetland, Prairie, Stream, Riparian Restoration (West Fork).

thoughtful, active transportation infrastructure and using a people-first approach in design will help facilitate this mode shift.

The shift will also provide a co-benefit of increased safety to cyclists and pedestrians who are considered vulnerable road users (VRUs) because they lack the protection of a vehicle body in the event of a collision, making them significantly more likely to suffer severe injuries when involved in a traffic crash. By expanding active transportation-supporting infrastructure with thoughtful and safety-focused design and providing incentives for personal use vehicles like e-bikes, low/zero emissions vehicle trips become viable options for a larger portion of the population. This improvement increases viable alternatives to traditional, high-emission travel, encouraging more people to opt for sustainable modes of transportation.

An additional co-benefit of multi-modal active transportation infrastructure is that it can be combined with spaces for plant materials that provide another method to capture and retain GHGs. These green spaces can also help reduce localized flooding and improve water quality, thus enhancing the overall resilience of NWA. Continuing to create an NWA Green Network that ties natural corridors and green spaces to alternative modes of transportation is aligned with recommendations from the U.S. Army Corps of Engineers to protect riparian corridors in the region (Hart et al. 2023). Given the rapid rate of population growth and urban densification in the region, combining the implementation of transportation mode-shift with creating an NWA Green Network of interconnected green corridors and trails that follow major streams and rivers, would help mitigate stormwater runoff from impervious surfaces, thereby protecting private property and public infrastructure from flooding and saving taxpayer dollars that would otherwise be spent on repairing damaged roads, bridges, and other infrastructure.

This measure supports the efforts of other organizations in the region to encourage mode shift. For example, Walmart aims for 10 percent of its Bentonville workforce to bike to work, encouraging employees to bike to work at least once a week and providing electric bikes for employees and their families to use. Walmart also worked with the City of Bentonville to relocate a section of the Razorback Greenway through its new global campus, which is slated to open in 2025 (Walmart 2024b).

Investment in equitable transportation infrastructure is a key pillar of both the IIJA and the IRA. Multiple grant programs through the U.S. Department of Transportation (USDOT; 2024), such as the Reconnecting Communities Pilot (RCP) program and Neighborhood Access and Equity (NAE) grant program, provide funding to support equitable access to community facilities, anchoring institutions to safer roads and streets that can incentivize the use of alternative modes of transportation. These programs can help support investments in infrastructure that facilitate a shift to active transportation modes like walking, cycling, and other micromobility modes that will work toward low/zero emissions trips. Opportunities also exist for the development of bikeshare programs intentionally focused within LIDACs.

GHG AND CO-POLLUTANT EMISSIONS REDUCTION

Infrastructure improvements aimed at encouraging a shift in transportation modes can help reduce GHG emissions by providing transportation choice.

In addition to infrastructure improvements, bikeshare programs can also enhance transportation choice in the region. The Ride 4 Smilies bikeshare program in Fort Smith has 1,302 users (or 1.5 percent of the approximate 89,000-person population). Between the program's inception in May 2022 and December 2023, these users have taken advantage of riding bikes (including e-bikes) and cumulatively traveled 8,152 miles over a period of 20 months. This federally funded program, which costs approximately $140,000 per year to administer, is focused on low-income residents and underserved communities. Based on the program survey,

36 percent of users indicated that bike trips replaced a personal vehicle trip (Tableau Public 2023). Therefore, approximately 1,761 miles of personal vehicle trips were eliminated in the Ride 4 Smilies bikeshare program per year.

If the bikeshare data is extrapolated from Fort Smith to the NWA region, which has a population of 576,400 people, and the same per capita use of the program is assumed as Fort Smith, then the NWA region could see a similar reduction in GHG emissions in the transportation sector per user. **Table 7** lists the reduction in VMTs in Benton and Washington counties, accounting for the projected population growth, if the per capita use of a bikeshare program in NWA were consistent with that of Fort Smith and remains constant through 2045.

Table 7. Projected Annual Carbon Dioxide Emissions Reduction in Benton and Washington Counties with a Bikeshare Program.

Year	VMT Reduction	Emissions Reduction (Metric Tons CO_2 per Year)
2030	38,193	15
2040	47,418	19
2050	58,712	24

AUTHORITY TO IMPLEMENT

As the Metropolitan Planning Organization (MPO) for the region, NWARPC can directly implement grant funding or allocate it to various projects within the MPO. NWARPC administers approximately $15 million annually in federal transportation formula funding suballocated to the Fayetteville-Springdale-Rogers, AR-MO urbanized area through the Surface Transportation Block Grant Program – Attributable (STBGP-A), Transportation Alternatives Program (TAP), and Carbon Reduction Program (CRP). Additionally, as the Federal Transit Administration (FTA) designated recipient for the region, NWARPC is responsible for administering approximately $4.4 million in urban transit formula funding to local transit agencies.

In addition to formula funding, if a discretionary implementation grant is pursued for this measure, it is anticipated that the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. The program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of the measure directly and/or deliver incentives to individuals and entities that could implement components of the measure. Public-private partnerships could also be a mechanism to implement this measure.

Cities in NWA have the authority to expand infrastructure for active transportation, including bicycle facilities, transit stops, and sidewalks, through local government initiatives and regional collaboration. Local governments, such as city councils and municipal planning departments, are primarily responsible for planning and implementing these projects. They work closely with the NWARPC to make sure infrastructure developments align with regional goals and receive necessary funding. These projects are often supported by regional, state, and federal grants, including those from the NWARPC, Arkansas Department of Transportation (ARDOT) and USDOT, which provide financial assistance through programs like the IIJA and IRA.

ANTICIPATED WORKFORCE NEEDS

Implementation of active transportation infrastructure to facilitate mode shifts requires a skilled workforce that has expertise in planning, engineering, and development. Workers skilled in project management and award administration will be essential for successful deployment of transportation programs potentially emerging from CPRG funding opportunities. Field service employees will be required for the construction and installation of many of these systems. Finally, the workforce will need to include workers to fulfill any compliance or regulation protocol for implemented components, such as constructing facilities to acceptable design standards recognized by the funding agency.

Discretionary grant programs established through the IIJA and the IRA place significant emphasis on workforce development activities connected with the proposed scope of work as part of their merit review criteria, especially for projects involving active transportation infrastructure. Grant applicants are encouraged to outline workforce training, hiring, and capacity-building plans within their proposals, aiming to build a skilled workforce that aligns with the specific needs of the project. The outline may include training programs for engineers, planners, and construction workers and support for apprenticeships, certifications, and partnerships with local educational institutions. Local and state agencies should consider formalizing relationships with local and regional institutions of higher education and the secondary education system to expand youth and registered apprenticeships in the construction trades to meet merit scoring criteria and advance regional workforce development targets (NGA 2023). Regarding mode shift workforce development specifically, there are opportunities to create career pipelines for both trail construction and bicycle repair through relatively new degree plans and certifications at Northwest Arkansas Community College (NWACC).

Additionally, these programs often prioritize proposals that demonstrate a commitment to hiring from underserved and local communities, further promoting equitable workforce development. For example, grants may award additional points for applicants who plan to create long-term employment opportunities or who partner with labor unions and training organizations. This approach not only addresses the immediate staffing needs of active transportation infrastructure projects, but also builds lasting skills in the local labor force, fostering sustainable career pathways in green infrastructure, project management, and regulatory compliance (NGA 2023).

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

Implementation of this measure could also lower expenses for low-income residents of NWA because the average costs to purchase and maintain a bicycle are significantly cheaper than costs to purchase and maintain a personal vehicle.

One potential barrier to the widespread adoption of cycling in NWA could be limited bike storage options for families living in multigenerational households or those who have limited space. Many families in NWA may face challenges in storing bicycles because of shared living arrangements. To address this issue, the region should prioritize the development of affordable and accessible bike storage facilities.

This effort could include the following:

- Investing in secure and affordable bike parking at apartment complexes, public housing, and other multifamily residences.
- Incorporating bike storage into the design and construction of new multifamily housing units.
- Exploring innovative solutions like bikeshare programs with designated secure storage locations.

These strategies will enhance the accessibility and convenience of cycling for families and other residents who have limited space, ultimately increasing the adoption of this sustainable transportation option.

Active transportation programs could also be designed to prioritize incentives for LIDAC populations, assuring equitable access to sustainable transportation options. Implementation of more hard-surface trails, a bikeshare program, or a bike rebate program helps provide access for disadvantaged members of the communities in NWA to access things like employment centers, childcare, grocery stores, social services, and other needs, in addition to the region's quality-of-life amenities such as parks and museums.

Rebates and subsidies for e-bikes and transit passes may also help motivate more people to change transportation modes. These same rebates and subsidies could be targeted at LIDACs, assuring that a switch to active transportation modes can be a viable alternative for underserved populations.

Additionally, as noted above, some of the merit scoring criteria is allotted to developing a sustainable workforce that facilitates education, training, and employment for LIDAC populations. When facilitating mode shift by implementing more active transportation infrastructure, a significant opportunity arises to create intentional workforce pipelines that provide education, training, and apprenticeships for the construction trades and trail building, bicycle repair and maintenance, and other vocations.

Land Use/Growth Policies

Reducing GHG emissions in the transportation sector can be most successfully accomplished by the following measure:

Updating/adopting building and zoning codes and policies/ long-range plans to encourage walkable, bikeable, and transit-oriented development (TOD) and creating environments where active transportation modes are practical and accessible.

Promoting responsible growth and community development policies and practices can be an effective long-range strategy to reduce GHG emissions in NWA. This focus on land use and growth policies is anticipated to be instrumental in lowering transportation-related emissions, supporting the goal of NWA to reach net-zero emissions by 2050. By shaping urban spaces to reduce car dependency, enhance connectivity, and limit the consumption of land through unchecked outward sprawl, this measure lays a foundation for sustainable, community-centered growth aligned with long-term environmental goals.

RATIONALE FOR MEASURE

Responsible land use planning can significantly mitigate emissions. Strategies such as zoning for higher-density housing near major transit corridors or implementing TODs in strategic areas reduce the need for long commutes. By promoting land use policies that prioritize walkability, transit accessibility, and bike infrastructure, the region can curb VMT and foster equitable access to transportation options. Assuring good walkability scores in existing and growing communities can be accomplished by closing gaps in sidewalks, providing thoughtful access to bike rental facilities, and building strategic transit stops. Connecting communities through safe, well-lit, and easy-to-navigate bicycle paths and trails can link residential areas with commercial and industrial sectors, allowing for easy access to recreation.

USDOT has a goal of
REDUCING VMT BY
20%
by 2030.

This approach also provides options for access to jobs for low-income households that don't own a personal vehicle.

Enhancing transportation choice is a necessary action for all communities to reduce VMT and GHG emissions. The **USDOT has a goal of reducing VMT by 20 percent by 2030** to assist with climate change goals. Investments in active transportation infrastructure have been shown to encourage significant behavior change when it comes to mode choice. For example, providing bikeshare or micromobility options in strategic locations provides transportation choice for residents. Effective land use planning should incorporate green spaces and traffic-calming measures to ensure safety for cyclists and pedestrians. One strategy to reduce VMT is compact development. **Compact development can reduce VMT by 20 to 40 percent compared to conventional development (Ewing et al. 2007). Additionally, compact development has the potential to reduce CO_2 emissions by 7 to 10 percent by 2050.** Investments in active transportation infrastructure in NWA, such as bikeshare programs and trail expansions, have already demonstrated emission reductions. These initiatives, when paired with responsible growth strategies, have the potential to amplify impacts regionally, especially as local governments adopt further incentives for alternative transportation modes.

Compact development can
REDUCE CO_2 EMISSIONS BY
7 - 10%
by 2050.

Communities focused on assuring effective land use planning may borrow strategies from the Institute of Transportation Engineers (ITE) Complete Streets initiative. This initiative references the integration of land use planning and emission reduction, particularly through its focus on responsible growth. ITE also discusses thorough measures for first and last mile connections, providing options that enhance transportation choice.

Often, transit stops are a significant distance from offices and recreation centers, making travel times longer and the trip less convenient overall. Several successful examples of initiatives that create a link between effective land use and transportation systems highlight the importance of sustainable, equitable communities. The ITE Complete Streets (ITE 2024) program stresses the importance of policies that consider land use that serves growing communities now and into the future. Elements of the Complete Streets initiative focus on reducing VMT, improving air quality, building mixed-use developments, applying and enforcing zoning regulations, and providing equitable access to alternate transportation methods.

In February 2025, the NWARPC Board of Directors adopted a Regional Complete Streets Design Guide to provide decision-makers, planners, and designers with a framework to create balanced streets that accommodate all modes of transportation, supporting the region's transportation goals, encouraging collaboration, and enhancing safety and accessibility for all roadway users.

GHG AND CO-POLLUTANT EMISSIONS REDUCTION

Land use efficiency plays a critical role in reducing transportation-related emissions. This strategy is one of three key measures in the transportation sector designed to support the region's net-zero emissions target by 2050. In addition to GHG emissions, a reduction in vehicle emissions may also reduce other harmful pollutants.

Compact, mixed-use developments can lead to a significant reduction in VMT by placing homes, jobs, and amenities within proximity. Simulations suggest that ***reducing the average commuting distance in NWA by just 10 percent could lower regional emissions by approximately 5 percent.*** Moreover, pedestrian and cycling infrastructure in compact communities reduces dependence on combustion engine vehicles, with every mile walked or cycled contributing to reduced emissions.

Reducing the average commuting distance in NWA

COULD LOWER EMISSIONS BY 5%.

Efficient land use also improves traffic flow by decreasing congestion and promoting the use of mass transit systems. For example, prioritizing transit hubs in high-density areas encourages greater public transit ridership, providing transportation choice in these areas. In addition, green corridors and permeable surfaces can enhance stormwater management and reduce urban heat islands, further supporting environmental goals. Enhancing access to bike paths and transit in urban areas like Fayetteville and Bentonville could directly lower emissions from short-distance trips.

Responsible growth policies and mixed-use zoning can significantly improve climate equity and the impact of extreme weather on disadvantaged and low-income communities by employing specific approaches that promote sustainable development and the equitable use of resources. The effects of climate change can disproportionately affect low-income communities, because their opportunities to move away from flood-affected areas or areas where soil pollution is prevalent are less obtainable. Strategies to mitigate the impacts of climate change include incorporating green spaces that can help with flood management; planting greenery and trees to make spaces more useful and habitable; removing less energy-efficient, older buildings and promoting the construction of greener buildings; and providing transportation choice by increasing walkability scores.

GHG credits and offsets can provide tangible benefits for low-income communities by spurring energy-efficient improvements. Installation of solar panels in lower income neighborhoods can decrease energy bills and provide jobs.

AUTHORITY TO IMPLEMENT

A cohesive framework for land use reform is essential. Local governments will need to align zoning ordinances with sustainable practices, such as transit-oriented zoning overlays, minimum density requirements, and incentives for developers to include affordable housing in high-density projects. Leveraging guidance from the Arkansas Council on Future Mobility can further streamline land use policies to accommodate electric vehicles (EVs), automated vehicles, and sustainable urban growth.

Federal funding opportunities exist through the IIJA and IRA and provide opportunities that align with land use and responsible growth initiatives. For example, funding opportunities like the Reconnecting Communities Pilot (RCP) and the Neighborhood Access and Equity (NAE) grant programs through the USDOT provide valuable funding to help communities address critical needs.

ANTICIPATED WORKFORCE NEEDS

Civil engineers, transportation planners, and geographic information systems (GIS) specialists have always been essential to planning communities. In many industries, including those mentioned above, the workforce and education for incoming workers is changing dramatically. While transportation technology can be a disruptive technology, the shift in workforce can be viewed as a benefit to society overall, as the opportunity for cleaner, safer, and more efficient transportation is often the result.

In every aspect of community planning, careful consideration should be given to the workforce and the opportunity to provide better alternatives to workers. Workforce development programs could include focus areas like sustainable design, clean engine mechanics, and apprenticeships and should consider remote work options. NWACC has a robust array of courses for creating and sustaining a skilled workforce. The University of Arkansas – Fayetteville also offers several courses and programs focused on building skilled workforces through their Workforce Development Program (University of Arkansas 2024a). In addition, the University of Arkansas – Fayetteville's "Reimagine Arkansas Workforce Project" provides online training in specific industries, including software development, health care, and manufacturing. This program was grant funded for a period of time and remains a national standard for workforce-focused training.

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

Land use and responsible growth policies have a direct and measurable impact on improved access to jobs, easier access to schools, and streamlined access to community services for disadvantaged populations. Prioritizing infrastructure projects in LIDACs can provide access to safer walking and biking routes and improved transit access.

Incorporating infrastructure for EVs into LIDACs can offer many benefits to community health and the economy. However, challenges and costs must be understood. The upfront costs of purchasing an EV can be prohibitive for low-income families. Once a vehicle is purchased, charging systems are needed but can be challenging to deploy and maintain in areas with dense housing and development. For example, a suburban home with a two- or three-car garage may have ample space and availability for installing a vehicle plug. However, in urban neighborhoods, many residents park on the street, outdoors, or in a parking facility (surface lot or garage) with other residents. EV charging stations can be costly to install, ranging between $5,000 and $50,000, depending on the capacity. Fast chargers can easily cost double that high range (FHA 2023). Federal and state grant programs exist to encourage the adoption of EV infrastructure. It is important to share the benefits of EVs with low-income communities so adoption can be increased.

It is important to note that while owning a personal vehicle can be very expensive once fuel, insurance, maintenance, and the cost of the vehicle are considered, using micromobility options is somewhat a novelty and can be very costly per mile, relatively speaking. For lower-income citizens, the use of bikeshare resources could be cost prohibitive.

Zoning changes can prioritize affordable housing near transit hubs, allowing low-income residents to reduce transportation expenses significantly. Community engagement should guide the planning process to make sure benefits like reduced emissions, enhanced connectivity, and economic opportunities are distributed equitably.

Mixed-use zoning reduces the need for long commutes and enhances accessibility for alternative transportation modes (ULI and SGA 2023). In NWA, where the population is expected to nearly double by 2045, such zoning can accommodate growth while minimizing environmental impacts. Responsible growth policies also encourage development near public transit and eliminate unnecessary parking requirements, further reducing vehicle dependency. Responsible growth policies and mixed-use zoning can also promote climate equity in the region by assuring LIDACs are not experiencing a disproportionate impact from flooding, drought, and extreme heat.

Clean Energy

Reducing GHG emissions in the transportation sector can be accomplished by the following measure:

Incentivize more efficient and lower/no emission modes of transportation by:

1. **Developing and implementing low/zero emission ridesharing and e-bike programs, with priority given to LIDACs.**
2. **Upgrading vehicle fleets by replacing internal combustion engine vehicles with low/zero emission vehicles.**
3. **Incentivizing eligible agencies, businesses, and individual automobile owners to purchase low/zero emission vehicles and associated infrastructure, with priority given to LIDACs.**
4. **Expanding supporting infrastructure for EVs, including bus fleets.**

Together, these initiatives form a comprehensive strategy that not only addresses environmental concerns, but also promotes equitable access to sustainable transportation options across NWA. The clean energy measure is expected to play a critical role in reducing transportation emissions, contributing significantly to NWA's overall net-zero goal by 2050.

RATIONALE FOR MEASURES

Expanding opportunities for alternative modes including e-bikes, EVs, and electric transit provides options for Arkansans, many of whom will choose a cleaner mode for travel. Most survey respondents through public engagement supported increasing EV charging infrastructure in NWA. A need for transportation choice in NWA was reflected in the results of the public survey associated with this planning effort. Providing thoughtfully located EV chargers, clean energy transit, and incentives for e-bikes would help facilitate transitioning to cleaner travel modes. These options will provide low/zero emission trip options as a viable transportation alternative for a larger portion of the population.

This measure aligns with broader sustainability efforts in the region. J.B. Hunt is taking significant steps to reduce its carbon emissions, aiming for a 32 percent reduction in carbon emissions from 2019 levels by 2034 (J.B. Hunt 2023), and recognized as a sustainability leader by S&P Global, earning a place on the 2024 Dow Jones Sustainability Index (J.B. Hunt 2025a). Locally, the City of Fayetteville has targeted acquiring a 10 percent alternative fuel vehicle fleet by 2030 and continuous fleet emission reductions each year (City of Fayetteville 2024).

Investment in clean energy travel modes is a key pillar for both the IIJA and the IRA. Multiple grant programs through the USDOT (2024), such as the Charging and Fueling Infrastructure (CFI) grant and the EPA's CPRG, Program provide funding to support clean energy transportation options. These programs can help support investment in infrastructure that facilitates a shift to clean energy travel modes such as e-bikes or EVs. Opportunities also exist for the development of e-bike rebate programs intentionally focused within LIDACs.

GHG AND CO-POLLUTANT EMISSIONS REDUCTION

Reducing these emissions through the implementation of a clean energy measure could facilitate a significant portion of the GHG reductions in the transportation sector and support the region's net-zero emissions target for 2050. An average of 53 EV miles were driven per 1,000 residents in Benton and Washington counties on a typical weekday during the second quarter of 2023 (Fitzpatrick et al. 2023). Extrapolating this figure out for a population of 521,436 people for both counties that same year, we can expect approximately 7,117,601 EV miles were driven annually.

According to the EPA, a typical passenger vehicle achieves approximately 22.2 miles per gallon, on average. For each gallon of gasoline burned, the EPA estimates 8,887 grams of CO2 is produced (USEPA 2024e), which means the region is currently emitting approximately 2,849 less metric tons of CO2 annually than if none of the residents in NWA were driving EVs in 2023. With more EV-supporting infrastructure, incentives, and intentional programming, if an estimated 10 percent of the population projected for Benton and Washington counties by 2045 (NWARPC 2021) were to adopt EVs (approximately 97,428 of 974,275 people), this would result in a reduction of approximately 260,631 metric tons of CO2 annually assuming the average fuel efficiency of petroleum-fueled vehicles remains constant.

Table 8. Projected Annual Carbon Dioxide Emissions in Benton and Washington Counties with Electric Vehicle Adoption

Year	Electric Vehicle Adoption Rate	Metric Tons CO_2 Emitted per Year
2030	10%	2,056,384
2040	40%	1,702,074
2050	80%	702,482

Table 8 lists the projected metric tons of CO2 emissions from the transportation sector with EV adoption, accounting for the projected population growth and assuming that the annual VMT for the region remains more or less constant between now and 2045.

AUTHORITY TO IMPLEMENT

As the MPO for the region, NWARPC can directly implement grant funding or allocate the funding to various projects within the MPO. If an implementation grant is pursued for this measure, it is anticipated that the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. The program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of the measure directly and/or deliver incentives to individuals and entities that could implement components of the measure. Public-private partnerships could also be a mechanism to implement this measure.

Cities in NWA have the authority to develop clean energy infrastructure and programs through local government initiatives and regional collaboration. Local governments, such as city councils and municipal planning departments, are primarily responsible for planning and implementing these projects. They work closely with the NWARPC to make sure that infrastructure developments align with regional goals and receive necessary funding. These projects are often supported by state and federal grants, including those from the ARDOT and USDOT, which provide financial assistance through programs like the IIJA and the IRA.

The state of Arkansas has appointed the Arkansas Council on Future Mobility to identify barriers to the implementation of EVs (and automated vehicles), including existing laws, policy review and recommendations, education and workforce development, and economic development (Arkansas Future Mobility Council 2022). Strategic alignment with this council's recommendations and initiatives will assure, as appropriate, that state regulations and priorities do not hinder or prohibit implementation.

ANTICIPATED WORKFORCE NEEDS

Implementation of these clean energy transportation measures requires a skilled workforce that has expertise in planning, engineering, design, and development. Workers skilled in project management will be essential for successful deployment of transportation programs potentially emerging from CPRG funding opportunities. Additionally, experts in program and policy fields will play a significant role in strategies regarding incentive programs or other promotional efforts for the adoption of EVs. Field service employees will be required for construction and installation of many of these systems, including electricians who may be required to have certifications through the Electric Vehicle Infrastructure Training Program (EVITP) to meet federal requirements for components like EV charging stations. Finally, the workforce will need to include workers to fulfill any compliance or regulation protocol for implemented components. For example, additional safety training may be required to provide knowledge on working in high-voltage environments.

Additionally, the MPO will look for opportunities to foster local workforce development by seeking out partnerships with local electrical unions and companies. Collaboration like this will focus on providing on-the-job training opportunities through EV infrastructure contracts and fleet transitions. These types of partnerships will allow the MPO to have a hand in fostering professional growth and providing local electricians and apprentices with the necessary skills to install and maintain EV charging stations. Discretionary grant programs established through the IIJA and the IRA dedicate merit review criteria to workforce development activities connected with the proposed scope of work as part of their merit review criteria, especially for projects involving transportation infrastructure. Grant applicants are encouraged to outline workforce training, hiring, and capacity-building plans within their proposals, aiming to build a skilled workforce that aligns with the specific needs of the project. This outline may include training programs for engineers, planners, and construction workers and support for apprenticeships, certifications, and partnerships with local educational institutions. Local and state agencies should consider formalizing relationships with local and regional institutions of higher education and the secondary education system to expand youth and registered apprenticeships in the construction trades to meet the merit scoring criteria and advance regional workforce development targets (NGA 2023). Regarding clean energy workforce development specifically, pipelines will need to be built with institutions and organizations that provide the specialized training needed for the manufacture and maintenance of electric transportation systems, including EVs, e-bikes, and charging stations. Some of these trainings and certifications will be manufacturer-specific (i.e., Tesla), while more general trainings are provided by groups like Automotive Service Excellence (ASE).

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

Clean energy measures would be designed to prioritize incentives for serving LIDAC populations, assuring equitable access to sustainable transportation options. Implementation of EV-supporting infrastructure, a bikeshare program, or an e-bike rebate program helps provide access for disadvantaged members of the communities in NWA to access things like employment centers, childcare, grocery stores, social services, and other needs, in addition to the region's quality-of-life amenities such as parks and museums.

Rebates and subsidies for e-bikes and transit passes may also help motivate more people to change transportation modes. These same rebates and subsidies could be targeted at LIDACs, assuring that a switch to clean energy modes of transportation can be a viable alternative for underserved populations.

Insights from the stakeholder and public engagement process as part of CPRG planning activities indicate diverse preferences among populations, with some individuals prioritizing car ownership while others benefit more from enhanced access to biking, walking, and public transit infrastructure.

The prioritization of locating EV charging equipment takes into consideration many factors, including the locations of LIDAC populations. Other factors such as land use types; proximity to existing charging stations; and proximity to parks, transit stops, and trailheads can all play a role in finding prime locations for new charging stations. When focusing on areas within a LIDAC, it is important to consider the built environment, such as areas where residents rely heavily on curbside parking. Curbside charging stations may be a solution in this case but would require different equipment than a typical charging kiosk someone might find in a parking spot.

Furthermore, LIDACs in the region may rely on some form of public transportation for daily trips. By replacing fossil fuel-powered vehicles with other no/low-emissions alternatives such as electrified micro-transit or hydrogen-fueled, cities can significantly reduce GHG emissions and air pollution, which leads to improved public health and a smaller carbon footprint. Electrified transit systems are also more energy-efficient, converting a higher percentage of energy into motion compared to traditional combustion engines. Additionally, they operate more quietly, reducing noise pollution in more urban areas. From an economic perspective, electrification lowers maintenance and fuel costs over the vehicle's lifespan, providing long-term savings. Because renewable energy sources increasingly power these systems, electrified transit supports a cleaner, more resilient energy future while enhancing the reliability and convenience of public transportation for passengers within the region.

Additionally, as noted above, some of the merit scoring criteria is allotted to developing a sustainable workforce that facilitates education, training, and employment for LIDAC populations. When facilitating clean energy transportation by implementing EV-supporting infrastructure, e-bike rebate programs, and bikeshare programs, there is a significant opportunity to create intentional workforce pipelines providing education, training, and apprenticeships for the construction trades and in specific high-voltage electrical training to install and maintain vehicles, e-bikes, and charging facilities.

Industrial Sector

MOMENTUM MAKERS

***Tyson Foods** targets 50% renewable electricity in U.S. operations by 2030, and it has partnered with groups that convert biogas from wastewater facilities into renewable natural gas.*

The industrial sector in NWA was responsible for 1,764,434 metric tons of GHG emissions in 2020, or 20 percent of the region's GHG emissions, primarily from burning fossil fuels for energy. A smaller amount of direct emissions comes from leaks from natural gas and petroleum systems, the use of fuels in production, and chemical reactions during the production of chemicals, metals, and minerals. Achieving regional sustainability goals outlined in this plan will require a significant reduction of GHG emissions in the industrial sector. **Table 9** shows a proposed GHG reduction pathway for this sector to support the regional goal of net-zero emissions by 2050.

The results of the public and stakeholder engagement and regional GHG analysis indicate that reducing GHG emissions in the industrial sector could be achieved by the following measure:

Reduce GHG emissions in the industrial sector by developing and implementing:

1. **Programs to support or incentivize implementation of energy-efficiency measures in industry**
2. **Programs to support or incentivize GHG reductions from industrial processes**

Progress in this sector could be monitored with updated GHG emissions data. The cost of implementing these measures varies by initiative.

Table 9. Projected Percent Reduction of Carbon Dioxide from Baseline Year.

Year	Percent Reduction from 2020	Metric Tons CO_2 Emitted per Year
2020	Baseline	1,764,434
2030	10	1,587,991
2040	25	1,323,326
2050	60	705,774

RATIONALE FOR MEASURES

The DOE gives the following recommendations for reducing GHG emissions in the industrial sector:

- Invest in multiple process strategies and parallel pathways such as low-carbon fuels; electrification; energy efficiency; and carbon capture, utilization, and storage.
- Scale implementation of measures through demonstrations and testbeds to accelerate and de-risk deployment of new technologies and processes.
- Address process heating efficiency and emissions. Process heating consumes more energy than any other type of operation in the industrial sector; most of the energy used for process heating originates from fossil fuels. To reach net-zero goals, efforts are needed to maximize efficiency and resource utilization associated with thermal energy while also transitioning to electrified and low-carbon fuel and energy sources (DOE 2022).

Companies that invest in energy-efficiency technologies and renewable energy sources can reduce operational costs in the long run. This not only makes them more competitive, but also aligns with the growing consumer demand for environmentally responsible products and services.

IMPROVEMENTS TO ENERGY EFFICIENCY

GHG emissions from industrial sources often result from on-site combustion of fossil fuels for heat and power, nonenergy use of fossil fuels, and chemical processes used in iron, steel, and cement production. In addition, industries also generate indirect emissions from the centrally generated electricity they consume. Energy efficiency is the most cost-effective option for GHG emission reductions in the near term. Measures to improve energy efficiency in the industrial sector of NWA can include the following:

- Conducting energy audits of industrial buildings, equipment, and processes.
- Engaging strategic energy management (SEM) approaches to manage energy use and improve energy performance industrial processes at the system level.
- Upgrading equipment, including smart manufacturing technologies and advanced data analytics, to improve energy efficiency in manufacturing processes.
- Creating the systems management and optimization of thermal heat from manufacturing process heating, boiler, and combined heat and power sources, with waste heat utilization (DOE 2022).

It's estimated that between ***20 percent and 50 percent of industrial energy input is lost as waste heat.*** Most on-site industrial energy is provided by fossil fuel combustion, which tends to transfer heat to the environment rather than the material being manufactured, leading to a lot of wasted energy. Recovering waste heat losses can generate cost savings, improve workflow and productivity, and reduce GHG emissions (DOE 2024).

IMPROVEMENTS TO INDUSTRIAL PROCESSES

GHG reductions in the industrial sector can also be accomplished through improvements to industrial processes. These improvements could include the following:

- Switching energy sources used in industrial processes, including to low/no carbon fuels, electrification, and renewable energy.
- Generating low-carbon electricity from both grid and on-site renewable generation sources.

20 - 50%
of industrial energy
IS LOST
as waste heat.

- Electrifying process heat using induction, radiative heating, or advanced heat pumps.
- Electrifying high-temperature range processes such as those found in iron, steel, and cement making.
- Replacing thermally driven processes with electrochemical ones.

Furthermore, regulatory pressures and future legislation on emissions make it prudent for industries to proactively address their environmental impact. By leading in sustainability, NWA can attract new business and talent, fostering innovation and economic growth in the region. Several large businesses have established sustainability goals that align with this measure.

Carbon capture, utilization, and storage (CCUS) is a multicomponent strategy of capturing CO2 generated from a point source and utilizing the captured CO2 to make value-added products or storing it long term to avoid release. Implementing CCUS in the industrial sector could include the following:

- Postcombustion chemical absorption of CO2.
- Development and manufacturing optimization of advanced CO2 capture materials that improve the efficiency and lower the cost of capturing carbon.
- Development of processes to utilize captured CO2 to manufacture new materials.

GHG AND CO-POLLUTANT EMISSIONS REDUCTION

The highest CO2-emitting industries across the nation include petroleum refining, chemical manufacturing, iron and steel manufacturing, cement manufacturing, and food and beverage manufacturing. Though only some of these industries currently operate in NWA, others may operate in NWA in the future.

Iron and steel manufacturing is one of the most energy-intensive industries worldwide, and it is among the highest emitters of GHG, primarily as a result of the use of coal as a feedstock in production methods and the chemical reduction of iron oxide. Reducing GHG emissions in the iron and steel manufacturing industry can be accomplished by transitioning to low- and no-carbon fuels, expanding industrial electrification, and performing pilot demonstrations for transformative technologies such as hydrogen-steel production, electrolysis of iron ore, and carbon capture and utilization storage. According to the DOE (2022), more than two-thirds of GHG emissions reduction in the iron and steel industry can come from improvements in energy efficiency and from switching to low- and no-carbon fuels and electrification. Demand for clean hydrogen and low-carbon electricity use in steelmaking is also expected to increase significantly by 2050. Research, development, and demonstration efforts are still needed to improve transformative technologies such as hydrogen-based steel production and iron ore electrolysis (DOE 2022).

The food and beverage manufacturing industry is also one of the largest energy-consuming and GHG-emitting industries in the U.S., and advancing the electrification of process heating, evaporation, and pasteurization processes may significantly improve energy efficiency in this industry. According to the DOE, natural gas accounted for most of the energy consumption in the food manufacturing industry in 2020, followed by grid electricity and renewables. The largest contribution to CO2 emission reductions in the food manufacturing industry will be from electrification and improving energy efficiency (DOE 2022). Tyson Foods has committed to using 50 percent renewable electricity, both purchased and self-generated, across its domestic operations by 2030, and it has partnered with groups that convert biogas from wastewater facilities into renewable natural gas (Tyson Foods 2022).

Cement manufacturing requires high levels of heat. Of the total emissions in the cement manufacturing industry, 42 percent is attributable to a heavy reliance on energy from coal and petroleum coke combustion. Approximately 58 percent of total CO2 emissions from cement manufacturing is related to the calcination process and is not associated with energy use. Therefore, upgrading to energy-efficient technologies or fuel switching alone cannot reduce GHG emissions from cement manufacturing. Process improvements through CCUS technologies and innovative chemistry will be important to achieving near-zero GHG emissions in cement production. The DOE estimates that the cement industry's adoption of CCUS will achieve approximately

65 percent of the total GHG emissions reduction needed to get to net zero in 2050 (DOE 2022).

Reduction of GHG emissions in the industrial sector will directly result in reduction of other criteria and hazardous air pollutant emissions, including ozone and particulate matter, less than or equal to PM2.5 emissions.

AUTHORITY TO IMPLEMENT

Municipal governments in NWA have several avenues to incentivize and promote GHG reduction in the industrial sector. They can leverage federal and state grants, such as those from the Energy Efficiency and Conservation Block Grant (EECBG) program, which provides funding for local projects aimed at reducing energy consumption and GHG emissions and improving energy efficiency (DOE 2023a). These grants can be used to support various initiatives, including energy assessments, efficiency upgrades, and the installation of renewable energy systems. Additionally, municipalities can implement local policies and ordinances that encourage or require energy-efficient practices and the adoption of clean energy technologies.

Municipal governments can offer financial incentives, such as tax credits, rebates, and low-interest loans, to businesses that invest in energy-efficient equipment and electrification projects. They can also create public-private partnerships to facilitate the development of sustainable infrastructure and provide technical assistance to industries looking to reduce their GHG emissions. By using these tools, municipal governments in NWA can play a pivotal role in driving the transition to a more sustainable and energy-efficient industrial sector.

Power and utility companies in NWA offer a variety of incentives to promote energy efficiency and electrification for industrial customers. For example, Ozarks Electrical Cooperative provides several programs aimed at reducing energy consumption and improving efficiency. These programs include cash incentives and rebates for energy-efficient equipment upgrades, such as lighting; heating, ventilating, and air conditioning (HVAC) systems; and industrial process improvements.

Another utility, Southwestern Electric Power Company (SWEPCO), offers similar incentives through its energy-efficiency programs. These programs provide rebates for energy-efficient equipment and systems and technical assistance to help industries identify and implement energy-saving measures (SWEPCO 2024). The Arkansas Public Service Commission supports various initiatives that encourage utilities to offer energy-efficiency programs, assuring that industrial customers have access to resources and financial incentives to reduce their energy consumption and transition to electrification (APSC 2024). By taking advantage of these incentives, industries in NWA can lower their operational costs and contribute to the region's sustainability goals.

ANTICIPATED WORKFORCE NEEDS

Reducing GHG emissions in the industrial sector in NWA will require a skilled and adaptable workforce. As industries transition to more sustainable practices, there will be a growing demand for professionals with expertise in renewable energy, energy efficiency, and environmental engineering. Workers will need to be trained in the latest technologies and methods for reducing emissions, such as carbon capture and storage, electrification of industrial processes, and the integration of smart-grid systems.

Industrial electrification in NWA will require a diverse and highly skilled workforce. As industries transition from fossil fuels to electric power, there will be significant demand for electricians, engineers, and technicians proficient in installing, maintaining, and upgrading electrical systems. Specialized training in areas such as electric process heating, heat pumps, and smart-grid technologies will be essential. Additionally, expertise in renewable energy integration, such as solar and wind power, will be crucial to support the electrification efforts.

Moreover, workforce development programs will need to focus on both upskilling the current workforce and training new entrants. This effort includes apprenticeships, on-the-job training, and certifications in energy management and industrial electrification. Collaboration with local educational institutions, such as community colleges and technical schools, will be vital to assure that the curriculum aligns with industry needs.

Furthermore, the measures for this sector will create opportunities for new job roles and career paths. For instance, there will be an increased demand for technicians and engineers to install and maintain renewable energy systems, such as solar panels and wind turbines. Workforce development programs and partnerships with local educational institutions will be essential to equip workers with the necessary skills and knowledge. By investing in training and education, NWA can build a resilient workforce capable of supporting the region's sustainability goals and driving economic growth through green innovation.

Several training programs and certifications can equip individuals with the skills needed to implement the measures for the industrial sector. One notable certification is the Certified Decarbonization Professional (CDP) offered by American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). This program validates the competency of professionals in assessing, analyzing, and developing strategies to reduce the GHG emissions of buildings. Another valuable certification is the Certified Energy Manager (CEM) from the Association of Energy Engineers (AEE), which focuses on energy efficiency and renewable energy technologies.

Additionally, the Sustainability Excellence Associate (SEA) and Sustainability Excellence Professional (SEP) certifications from the International Society of Sustainability Professionals (ISSP) are excellent for those looking to demonstrate broader sustainability expertise. For those interested in carbon management, the Diploma in Carbon Management from the Greenhouse Gas Management Institute provides in-depth knowledge on measuring and managing GHG emissions. By investing in these training programs, NWA can build a robust workforce capable of driving regional efforts to reduce GHG emissions from industrial sources and contribute to broader GHG reduction goals. These programs, among others, can help individuals gain the necessary skills to support the implementation of GHG reduction measures in NWA and beyond.

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

Reducing GHG emissions from industrial sources in NWA could significantly improve the health of LIDACs. Industrial emissions often contribute to air and water pollution, which can lead to respiratory issues, cardiovascular diseases, and other health problems. Reducing these emissions would improve the air quality, leading to fewer health issues and lower health care costs for these communities (USEPA 2024c). Cleaner air and water would also create a healthier environment for children to grow up in, reducing the long-term health disparities that often affect disadvantaged populations.

In addition to health benefits, implementing these industrial sector measures could create new job opportunities in NWA. The transition to cleaner technologies and renewable energy sources would require a workforce skilled in these new areas, leading to job creation in sectors such as renewable energy, energy efficiency, and green construction. These jobs could provide stable, well-paying employment for residents of LIDACs, helping to lift them out of poverty and improve their overall quality of life. Furthermore, investing in green infrastructure and technologies could attract new businesses to the region, fostering economic growth and providing even more job opportunities.

Buildings Sector

Residential and commercial buildings in NWA were responsible for 1,146,882 metric tons of GHG emissions in NWA in 2020, or 13 percent of the total GHG emissions in the region. GHG emissions in the building sector are primarily generated from fossil fuels burned for heat, gases used for refrigeration and cooling in buildings, and nonbuilding-specific emissions such as the handling of waste. Achieving regional sustainability goals outlined in this plan will require a reduction of GHG emissions in the building sector. **Table 10** shows a proposed GHG reduction pathway for this sector to support the regional goal of net-zero emissions by 2050.

Table 10. Projected Percent Reduction of Carbon Dioxide from Baseline Year

Year	Percent Reduction from 2020	Metric Tons CO_2 Emitted per Year
2020	Baseline	352,887
2030	10	1,032,194
2040	25	860,162
2050	60	423,464

MOMENTUM MAKERS

- ***Walmart**'s new home office campus will feature 12 LEED Platinum, fully renewable energy-powered buildings, energy-efficient designs (dynamic glass, LED lighting), 300+ EV charging stations, and a bike-friendly environment.*
- ***J.B. Hunt** is reducing building GHG emissions through on-site solar, battery storage, and an advanced energy management system. New buildings will be all-electric with solar panels and EV charging, and renovations will prioritize electric solutions.*
- ***University of Arkansas** aims for carbon neutrality by 2040 with deriving 80% of its energy from solar. Since 2006, they've added 2 million square feet of LEED Silver certified green building space, covering 19% of the campus area.*

The results of the public and stakeholder engagement and regional GHG analysis indicate that reducing GHG emissions in the building sector could be achieved by the following measure:

Develop a residential/commercial energy-efficiency and innovation program by:

1. **Establishing an incentive program for implementation of end-use energy-efficiency measures and certified energy-efficient appliances, heating and cooling equipment, and lighting.**
2. **Providing incentives for adoption and implementation of up-to-date building energy codes.**
3. **Developing voluntary programs and policies that promote low- and zero- emission options, bicycle storage, and vehicle charging, with a focus on buildings in rural and LIDAC areas; multifamily residential buildings; and commercial buildings.**

Progress in this sector could be monitored with updated GHG emissions data or energy use data from local utilities.

RATIONALE FOR MEASURES

Energy-efficiency measures could include replacing old appliances with newer, higher-efficiency appliances; installing higher-efficiency lighting; replacing windows and sealing them to reduce or eliminate leaks; and improving insulation. Existing energy-efficiency programs, for example those provided by Black Hills Energy, could be expanded on or extended further with CPRG implementation grant funding. Such programs reduce energy use, thereby reducing emissions and cost. Public survey data for NWA indicated an interest in and support for energy efficiency. Updating building energy codes could help to drive the effectiveness of an energy-efficiency program.

At times, electrification of heating may be desired and cost-effective for residential and commercial buildings, especially if paired with an incentive program. Developing programs and policies that promote EV charging infrastructure in residential and commercial buildings will help support a faster transition to EVs for those who desire access to such infrastructure.

The IIJA established multiple programs, including the Cost-effective Codes Implementation for Efficiency and Resilience grant program, the EECBGP, and the Building Resilient Infrastructure and Communities (BRIC) grant program, to advance building code updates and other building efficiency policies within a particular region, state, or local jurisdiction. Through the IRA, the $1 billion Assistance for Latest and Zero Building Energy Code Adoption program was created to adopt codes for residential buildings that meet or exceed the 2021 International Energy Conservation Code (IECC) and/or adopt a building energy code for commercial buildings that meets or exceeds American National Standards Institute (ANSI)/ ASHRAE/ Illuminating Engineering Society (IES) standards. To support the LIDAC households, the DOE administers the Weatherization Assistance Program (WAP) and various home energy rebate programs to assist with energy-efficient home retrofits. To advance energy-efficiency building code updates, the region should look to develop a robust partnership with the state- and community-based organizations to apply for future funding rounds.

Some of the NWA region's largest employers are already committed to taking steps to reducing GHG emissions associated with their office buildings.

Walmart Home Office

The construction of Walmart's new home office campus is expected to be completed in 2025-2026. Walmart's goal is for the campus's 12 office buildings to be Leadership in Energy and Environmental Design (LEED) Platinum certified, entirely powered by renewable energy, and equipped with energy-efficient features including dynamic glass covering 450,000 square feet

and LED lighting. The campus will have more than 300 EV charging stations and be a bike-friendly campus that includes bike paths, 1,000 bike parking spaces, and a fleet of electric bikes that employees can rent. Walmart is also planning to transition its physical computer servers to the cloud to reduce energy consumption (Walmart 2024b).

J.B. Hunt Headquarters

J.B. Hunt is also committed to reducing GHG emissions in its office buildings, including through on-site generation of solar energy and electricity storage with batteries. As J.B. Hunt expands its corporate campus, all new buildings will be constructed to be entirely electric, and preference will be given to electric solutions when renovating existing buildings or replacing existing nonelectric systems. All new office towers and parking decks will be designed to incorporate solar panel systems at roof level and will include EV charging stations with bidirectional charging. J.B. Hunt also plans to implement an advanced energy management system (EMS) in all its buildings to reduce energy consumption and operational costs while improving sustainability. Advanced EMS measures often include installing sophisticated technology that monitors and controls energy use in real time and uses data analytics, automation, and smart sensors to identify energy inefficiencies, optimize equipment settings, and prioritize energy-saving measures across a building's HVAC, lighting, and other systems (J.B. Hunt, unpublished data, 2024).

University of Arkansas

The University of Arkansas has set a goal of achieving carbon neutrality by 2040 with plans for 80 percent of energy consumption to originate from campus-produced solar. Buildings on campus account for most of the university's carbon footprint. The university pledged in 2006 to develop all new construction and significant renovation projects in accordance with LEED Silver standards. Since then, green building space totaling 2 million gross square feet (GSF) has been constructed, amounting to 19 percent of the GSF of the entire campus, with plans to certify additional structures in the future (University of Arkansas 2024b).

GHG AND CO-POLLUTANT EMISSIONS REDUCTION

Residential buildings in NWA were responsible for 488,507 metric tons of GHG emissions in NWA in 2020, or 4 percent of the total GHG emissions in the region. **Table 11** outlines a proposed GHG reduction pathway for residential buildings to support the regional sustainability goal of net-zero emissions by 2050.

Commercial buildings in NWA were responsible for 793,995 metric tons of GHG emissions in 2020, or 9 percent of the region's GHG emissions. **Table 12** outlines a proposed GHG reduction pathway for commercial buildings to support the regional sustainability goal of net-zero emissions by 2050.

Table 11. Projected Percent Reduction of Greenhouse Gases for Residential Buildings from Baseline Year

Year	Percent Reduction from 2020	Metric Tons CO_2 Emitted per Year
2020	Baseline	352,887
2030	10	317,598
2040	25	264,665
2050	70	105,866

Table 12. Projected Percent Reduction of Greenhouse Gases for Commercial Buildings from Baseline Year

Year	Percent Reduction from 2020	Metric Tons CO_2 Emitted per Year
2020	Baseline	793,995
2030	10	714,596
2040	25	595,496
2050	60	317,598

If 20 percent of current building emissions could be reduced by energy-efficiency measures and another 20 percent could be reduced by electrification, the impact could be an overall reduction of regional GHG emissions of 5 percent (IEA 2023). This GHG emissions reduction largely depends on the amount of funding that is available for implementation of the components contained within this measure.

In addition to GHG emissions reductions, other co-pollutant emission reductions would be realized for criteria and hazardous air pollutants, including a resultant positive impact from reduced ozone and particulate matter less than or equal to PM2.5 emissions and the associated health impacts of those emissions.

AUTHORITY TO IMPLEMENT

A building energy-efficiency innovation program could extend incentives to several different entities. If such a program were to be implemented to pursue this measure, it is anticipated that the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. This program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of this measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. Public-private partnerships could also be a mechanism to implement this measure, including with Black Hills Energy, which already has an established energy-efficiency program (Black Hills Energy 2023).

ANTICIPATED WORKFORCE NEEDS

The building energy-efficiency industry requires a diverse range of skills and expertise to assess, design, develop, construct, and operate energy-efficient buildings. Professionals who have backgrounds in engineering; building design and construction; project management; HVAC; and technical expertise are in high demand. Organizations that oversee program implementation will also have procurement and oversight responsibilities. In addition, qualified construction/renovation professionals and technicians will be needed to make these changes.

Overall, implementation of this measure is anticipated to result in an increased demand for workers and an associated need for workforce development and training, which should have a positive impact on the economy in NWA. The state should evaluate existing career and technical college building trade programs (e.g., HVAC, plumbing, electrical, construction technology) for coursework and training on energy-efficient construction methods and materials. These institutions should be encouraged to adopt industry-recognized certificates or credentials in energy-efficient technologies and methods.

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

A building energy-efficiency innovation program could be structured in a manner that prioritizes incentives for LIDAC and rural populations. Public survey data for NWA indicated an interest in and support for building energy-efficiency measures. Energy-efficiency measures not only reduce GHG emissions, but also have a positive impact on LIDACs on a fixed and/or limited income. Such measures can help people feel safer and more comfortable in their housing and may result in positive health impacts. This program could be structured in a manner that meets the desires and needs of the population served and would focus on providing equitable outcomes through its incentive programs.

Agricultural Sector

MOMENTUM MAKERS

***Tyson Foods** aims for 100% climate-smart feed sourcing by 2030, and 50% renewable electricity use in U.S. operations.*

In 2020, the agricultural sector in NWA was responsible for approximately 6 percent (488,507 metric tons) of the region's GHG emissions, primarily from poultry production, livestock, agricultural soils, and crop production. **Table 13** shows a proposed GHG reduction pathway for the agricultural sector to support the regional sustainability goal of net-zero emissions by 2050.

Table 13. Projected Percent Reduction of Greenhouse Gases from Baseline Year

Year	Percent Reduction from 2020	Metric Tons CO_2 Emitted per Year
2020	Baseline	488,507
2030	10	439,656
2040	25	366,380
2050	60	195,403

The results of the public and stakeholder engagement and regional GHG analysis indicate that reducing GHG emissions and increasing carbon capture in the agricultural sector could be achieved through the following measure:

Incentivizing agricultural practices to reduce GHG emissions and create carbon capture, including:

1. **The implementation/construction of anaerobic digester facilities to divert organic agricultural waste that is currently being landfilled and/or land applied and convert it into fuel or into agricultural and environmentally beneficial products.**
2. **The implementation/construction of biochar pyrolysis facilities to convert organic waste into agricultural and environmentally beneficial products.**
3. **The implementation of renewable energy-powered equipment and infrastructure.**

Progress in this sector could be monitored with updated GHG emissions data. The cost of implementing these measures varies by initiative.

RATIONALE FOR MEASURE

Implementing new measures to reduce GHG emissions in the agricultural sector in NWA could benefit Arkansans in a variety of ways.

GHG EMISSION REDUCTION

Farming equipment and infrastructure that use renewable energy will decrease GHG emissions, including reducing co-pollutants such as ground-level ozone. Strategies that use renewable energy in farming infrastructure include solar energy to power poultry houses, cattle barns, or other agricultural infrastructure. Also, incentivizing the use of farm equipment and machinery that use biofuel or natural gas captured from anaerobic digesters or landfills, including trucks used to deliver agricultural waste to anaerobic digester facilities or for transporting poultry and livestock to processing plants, can also reduce GHG emissions.

Transitioning farming equipment and infrastructure to low or no-emission fuel sources is one of the key measures in the agriculture sector designed to support the region's net-zero emissions target by 2050. Achieving this goal can be further aided by carbon sequestration in the agricultural sector.

Biochar Pyrolysis

Pyrolysis is a process by which organic material can be degraded, resulting in a solid residue know as biochar. Up to 4,000 kilograms (kg) of biomass can be processed per hour by pyrolysis and gasification units, which can be run locally or regionally by larger enterprises or cooperatives. Commercially accessible small-scale gasification and pyrolysis systems with biomass inputs ranging from 50 kilograms per hour (kg/hr) to 1,000 kg/hr can be used on farms or by small businesses (International Biochar Initiative 2024).

Anaerobic Digestors

In the process of anaerobic digestion, microbes break down organic materials in the absence of oxygen. The resulting digestate is known as biogas and consists of CH4 and CO2 (USEPA 2024d), which can be reused as fuel.

Anaerobic digestion can help reduce the emission of GHGs in a variety of ways.

- Replacing fossil fuels
- Reducing or eliminating the energy footprint of waste treatment plants
- Reducing CH4 emissions from landfills
- Displacing industrially produced chemical fertilizers
- Reducing vehicle movements associated with hauling agricultural waste
- Reducing electrical grid transportation losses

Bioenergy with Carbon Capture and Storage (BECCS)

The technique of capturing and storing CO2 from processes that turn biomass into fuels or burn it directly to produce energy is known as Bioenergy with Carbon Capture and Storage (BECCS) and is currently considered the only method of removing CO2 that can also produce energy. In the net-zero emissions by 2050 scenario, BECCS would be crucial to reducing carbon emissions in the industrial and transportation sectors, such as heavy manufacturing, aviation, and trucking, because bioenergy can provide high-temperature heat and fuels that run current engines (Fajurdy & Greenfield 2024).

The construction and implementation of a BECCS facility in NWA could upcycle and divert agricultural waste to high-value agricultural products or convert this waste into environmentally friendly products such as biochar and biofuel (Carbon Chicken LLC 2024a). A larger-scale BECCS facility could eventually provide green energy that can be sold back to the grid as an auxiliary power source for the region. The green energy could not only reduce GHG emissions, but also help reduce the cost of electricity to residents of NWA.

Agricultural Benefits

Biochar has a variety of environmentally beneficial uses in agriculture. When incorporated into soil, biochar improves soil health and soil fertility by providing a carbon source for plants and microbes (Zomer et al. 2017; Nazir et al. 2024) and may increase crop yields (O'Neil and Miesel 2020). Biochar improves soil structure by reducing compaction (Jien and Wang 2013), improves soil water retention (Razzaghi et al. 2020), and can immobilize soil pollutants and reduce their bioavailability (Bolan et al. 2024).

Other agricultural uses for biochar include use in poultry farming to control moisture and odor. Biochar can provide moisture control and reduce pathogens in the poultry houses when added to bedding, which improves the health of chickens by reducing respiratory issues and disease risk. When incorporated into the chickens' diet, biochar can reduce odor from ammonia emissions from poultry litter (Kalus et al. 2020).

Water Quality Improvements

The biochar can also be used to improve water quality in local streams and rivers, especially those flowing through watersheds with heavy agricultural use. Benton County is one of the leading counties in NWA for both poultry and cattle production (IRWP 2024). Approximately 1,900 chicken houses in the Illinois River watershed produce 354,000 tons of poultry litter a year, resulting in excess nutrients such as phosphorus contaminating the watershed and contributing to poor water quality and impairment of streams. Cattle and poultry waste contribute 5,534 tons of phosphorous a year to the watershed (Thompson 2023).

Animal waste used to produce biochar would divert many of these nutrients from the watershed, reducing eutrophication and algae blooms (Carbon Chicken Project LLC 2024b). A BECCS facility could remove approximately 100,000 metric tons of poultry litter from the Illinois River watershed each year and convert it into environmentally beneficial products (Hardin and Ims 2024). This biochar could then be used as a bioremediation tool to trap heavy metals and excess nutrients originating from pastures and streams, further benefiting the Illinois River watershed (Mohanty et al. 2018; Fu et al. 2024; Hardin and Ims 2024).

Carbon Sequestration

The biochar pyrolysis is also an effective way to sequester carbon from agricultural waste (O'Neil and Miesel 2020) and is currently one of the carbon removal technologies with the highest technology readiness level that can assure permanent sequestration within the time frames relevant to GHG reduction projects (Chiaramonti et al. 2024). This biochar can then be incorporated into soil to improve carbon sequestration of that soil. Soils with greater carbon content are more favorable for microbial activity and plant growth, which enhances the ability of these soils to sequester additional carbon (Zomer et al. 2017; Nazir et al. 2024).

GHG AND CO-POLLUTANT EMISSIONS REDUCTION OR SEQUESTRATION

Agriculture plays a vital role in the NWA's economy and the health of the region's environment. Cultivating a more sustainable agricultural system will not only support the long-term viability of NWA's agricultural sector but also play a crucial role in safeguarding the quality of life for the region's residents.

Emission Reduction

The Joint Institute for Strategic Energy Analysis (JISEA) conducted two studies to show how farms and agricultural production facilities can make their energy generation and consumption more sustainable. JISEA determined that if farms utilize digestate projects and biogas fuels, then potentially 12,000 metric tons of CO2 emissions from gasoline and 5,700 metric tons from manure management could be avoided (NREL 2021). Anaerobic digester facilities can benefit the region by aiding in biofuel production, diverting agricultural waste from the landfill and farms, and reducing GHG emissions. All these benefits help improve the air and water quality within the region. BECCS facilities can also provide a method of producing clean energy and have the additional benefit of capturing CO2 from the atmosphere.

Direct GHG emissions released by manure management include CH4, N2O, and CO2. These emissions come from manure management, urea fertilizer use, enteric fermentation during livestock production, soil and land use management changes, and energy use on farms.

HAY + CROPLAND
sequester
1,124,636
metric tons of carbon
each year.

Electrification of machinery, anaerobic digestion of poultry litter, and composting on a farm mitigates the carbon footprint of the agricultural production section. GHG emissions can be reduced by 206 percent by using anaerobic digestion of poultry litter and 102 percent by composting (Hassanein et al. 2024). In addition, the implementation of a BECCS facility in the region could displace the application of fertilizers, using fossil fuels for 60,000 acres each year (Hardin and Ims 2024).

Carbon Removal

Approximately 540,677 acres (31 percent) of the region is covered by pastures that are used for cattle, poultry, and/or hay production, and an additional 32 acres (0.002 percent) are covered by cropland. ***Together, these lands sequester approximately 1,124,636 metric tons of carbon each year.*** Incorporating locally produced biochar into the soils of these lands could sequester an additional 30,000 metric tons of carbon per year (Hardin and Ims 2024).

Other opportunities for the carbon sequestration with biochar in NWA include its use in urban greening projects like park development and tree planting. Applying 5 metric tons of 100 percent biochar mixture per acre in urban greening projects could sequester roughly 14.6 metric tons of CO_2 equivalent per acre. If the City of Fayetteville, for example, produced 4,000 yards of compost each year, and a mixture of 20 percent biochar and 80 percent soil were added to this compost, then an additional 1,584 tons of CO_2 could be sequestered annually through the Fayetteville composting program alone (Carbon Chicken Project LLC 2024b).

AUTHORITY TO IMPLEMENT

Authority to implement this measure primarily lies with private landowners, poultry and livestock farmers, and agricultural businesses operating in NWA. However, municipal and county governments can still have a role in incentivizing and implementing biochar and anaerobic digestion facilities through public-private partnerships or through the permit and planning approval and oversight process. Strategic alignment with regulatory authorities and initiatives will ensure, as appropriate, that state and federal regulations and priorities do not hinder or prohibit implementation. Partnerships with the University of Arkansas and funding from public and private agencies could also advance the implementation of this measure.

Regional initiatives to convert poultry litter into biochar include the Carbon Chicken Project, which is funded by a Conservation Innovation Grant (CIG) from the Natural Resources Conservation Service (NRCS). In addition, Tyson Foods Inc. is currently working to reduce carbon emissions in its protein value chain and supporting climate-smart practices for 25 percent of the acres needed to raise grain to feed its chickens, with efforts to purchase 100 percent of its feed ingredients from suppliers engaged in climate-smart practices by 2030. Tyson Foods Inc. is also working to establish a pathway to using 50 percent renewable electricity, both purchased and self-generated, across its domestic operations.

ANTICIPATED WORKFORCE NEEDS

Implementation of these agriculture measures requires a skilled workforce that has expertise in planning, scientific research, design, and development. Workers skilled in scientific research and design will be essential for the successful deployment of organic waste diversion programs that could potentially emerge from NRCS or U.S. Department of Agriculture (USDA) funding opportunities.

Additionally, experts in program and policy fields could play a significant role in strategies regarding incentive programs or other promotional efforts for the adoption of renewable energy-powered farm equipment.

Labor and workforce training will be required for the operation, maintenance, and repair of farm equipment and machinery powered by renewable energy sources; for the installation of solar panels that power poultry houses and cattle barns; and for the construction, operation, and maintenance of BECCS facilities.

Finally, the workforce will need to include workers who will fulfill any compliance or regulation protocol for implemented components. Discretionary grant programs established through the USDA often require that workforce development activities be included with the proposed scope of work for which funding is being sought (NIFA 2022). Local and state agencies should consider formalizing relationships with local and regional institutions of higher education and the secondary education system to expand youth and registered apprenticeships in the agricultural and scientific research trades to meet the merit scoring criteria and advance regional workforce development targets.

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

Madison County has the highest rate of farmers, construction workers, and maintenance workers in the NWA region, comprising 8 percent of the county's population. Washington County and Benton County follow with 5 percent and 4 percent, respectively, of their populations being farmers, construction workers, and maintenance workers.

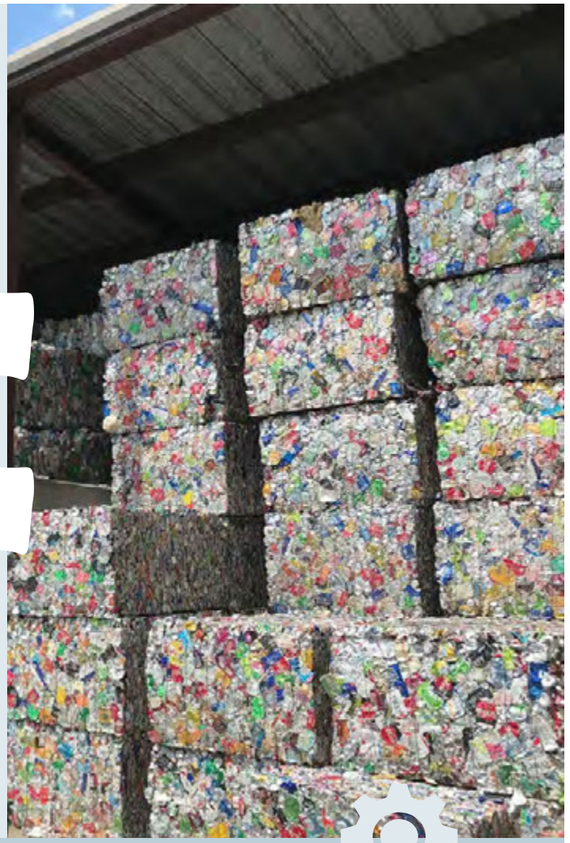
This measure could improve air and water quality in the region if co-pollutant emissions are reduced. Excess nutrients from legacy land application of poultry litter and animal manure caused eutrophication of waterways within the watershed. Because of the karst geology of the Illinois River watershed, this situation also affects the quality of groundwater and well water that many rural residents rely on for drinking water. Diverting organic agricultural waste from future land application within the watershed could supplement other efforts in the region to improve the water quality of the Illinois River.

The installation of anaerobic digester facilities and biochar offers a chance for job growth and workforce development. Increased produce grown in local community and home gardens, as well as for the local farmers market, can be facilitated by biochar, adding local produce to the region's food supply. Additional produce in the region could add food security for low-income residents and reduce costs for farmers to ship their products and for consumers to buy locally grown food.

The increased use of biochar would result in the increased need for new anaerobic digester facilities, biochar pyrolysis facilities, and/or BECCS facilities. There would be a need for construction, operation, and maintenance workers to build, run, and maintain the new facilities. This effort would create new job opportunities for rural communities, including minority populations.

Many farmers in the region already operate on low margins and could be hesitant to take on risk or make changes to their operations that could be costly. Funding from state or federal agencies to implement the agricultural measures included in this plan could assist those farmers in low-income or disadvantaged communities.

Waste & Recycling Sector



MOMENTUM MAKERS

- ***Walmart*** *provides free recycling access at seven NWA stores and diverted 78% of its U.S. operational waste from landfills in 2023, including over 900 million pounds of food waste.*
- ***Tyson Foods*** *diverted 35.5 tons of organic waste at its headquarters and composted over 10 million pounds of food/yard waste in 2022. Eight of its plants are Zero Waste to Landfill.*
- ***University of Arkansas*** *targets 70% waste diversion by 2027 and 90% by 2040.*
- ***City of Fayetteville*** *aims for 40% waste diversion and a 5% per capita landfill waste reduction by 2030.*

The results of the public and stakeholder engagement and regional GHG analysis indicate that carbon sequestration and GHG emission reduction in the waste and recycling sector could be achieved through the following measure:

Develop and implement a waste minimization and management program that reduces GHG emissions by:

1. **Providing incentives for community composting programs.**
2. **Supporting development of a biochar pyrolysis facility and/or gasification facility to convert organic waste into fuel or environmentally beneficial products.**
3. **Providing incentives for anaerobic digester facilities to be implemented/constructed at wastewater treatment facilities to divert organic waste that is currently being landfilled and/or land applied into compost and other environmentally beneficial products.**
4. **Providing incentives or a voucher system to improve waste management for rural populations.**
5. **Developing a regional Materials Recovery Facility (MRF) with end-market transparency.**

Progress in this sector could be monitored with updated GHG emissions data or data from local recycling centers and solid waste districts. The cost of implementing these measures varies by initiative.

RATIONALE FOR MEASURES

Since 1979, the Waste Management Eco Vista landfill located in Tontitown has been the only landfill serving the waste disposal needs of NWA.There has been significant growth in this region over the last several decades, with NWA recently ranking as the 15th fastest growing region in the U.S. (Sparkman 2023). As the 100th largest metropolitan area in the country (Northwest Arkansas Council 2023), the waste management needs of NWA have increased considerably, and the existing landfill is approaching its capacity. In addition to household and commercial waste, waste from construction and demolition in the region will continue to increase as the region grows. Public and private entities are currently pursuing, or have expressed interest in pursuing, the development of waste minimization and management facilities that can simultaneously reduce GHG emissions in the region. This specific GHG reduction area is ripe for program development with regional and/or state implementation and leadership.

Few federal funding programs exist to support the identified implementation measures. However, the EPA's Solid Waste Infrastructure for Recycling Infrastructure Grant program is a prospective funding opportunity to support the development or update of plans to advance post-consumer materials management development; strengthen and/or implement comprehensive data collection efforts; and support the state-led implementation of plans that advance post-consumer materials management.

The construction and implementation of a BECCS facility in NWA could upcycle and divert agricultural waste to high-value agricultural products or convert this waste into environmentally friendly products such as biochar and biofuel. A larger-scale BECCS facility could upcycle and divert waste such as biosolids from wastewater treatment, storm debris, or urban slash piles to high-value products that sequester carbon and regenerate depleted soil organic matter (Carbon Chicken LLC 2024a), and it could eventually provide green energy that can be sold back to the grid as an auxiliary power source for the

region. The green energy could not only reduce GHG emissions, but also help reduce the cost of electricity to residents of NWA.

Biochar has many uses, including water treatment. Biochar has been extensively used as an adsorbent to remove toxic metals, organic pollutants, and nutrients from wastewater, including in the treatment of industrial wastewater (e.g., dye, battery manufacture, and dairy wastewater), municipal wastewater, agricultural wastewater, and stormwater (Xiang et al. 2020). Biochar also has applications in stormwater management as a filtration media, and it can be integrated into bioretention systems, bioswales, green roofs, filter strips, tree boxes, and downspout filter boxes to absorb stormwater and filter contaminants such as heavy metals and organic pollutants (Mohanty et al. 2018).

An additional use for biochar includes biochar-based asphalt mixtures in newly constructed bike trails. An asphalt mixture consisting of 6 percent biochar increases the melt temperature of asphalt, improving its resilience to high ambient temperature during the hottest days of the year (Jeffry et al. 2018) and sequestering carbon in the process

Other uses for biochar include as a sustainable construction and building material because of its low thermal conductivity, high chemical stability, and low flammability (Legan et al. 2022). Biochar can be integrated into cement and insulation products, enhancing both their performance and sustainability. By incorporating biochar, the compressive strength and durability of concrete can be improved while simultaneously reducing the material's carbon footprint (Barbhuiya et al. 2024). Biochar has also been shown to be a good material for insulation. Because it has low thermal conductivity, biochar is a good insulator, and its high porosity helps disrupt the flow of heat in multiple directions. Biochar can also absorb up to five times its weight in water, which can help regulate indoor humidity levels (Osman et al. 2023).

This measure is part of a growing regional commitment to sustainability. For instance, Walmart is actively working to reduce landfill waste in the region and throughout its global footprint. The company has provided community recycling units at seven of its retail locations in NWA to provide the community with an avenue to recycle materials at a free, self-service drop-off container (Walmart 2024a). In 2023, Walmart diverted 78 percent of its operational waste in the U.S. from landfills by diverting more than 900 million pounds of food waste from landfills to composting, animal feed, anaerobic digestion, and biochemical processing (Walmart 2023).

Tyson Foods is also taking steps to reduce the amount of waste it is contributing to the environment and landfills. In 2022, Tyson reported that it had diverted 35.5 tons of organic waste from the landfill at its headquarters in Springdale through its Composting Waste Program. Tyson Foods also has eight U.S. plants validated as Zero Waste to Landfill facilities. In 2022, Tyson Foods composted more than 10 million pounds of food waste and yard waste (Tyson Foods 2022).

Other organizations in the region that are taking steps to reduce waste include the University of Arkansas, which intends to divert 70 percent of its waste from landfills by 2027 and 90 percent by 2040 (University of Arkansas 2024c), and the City of Fayetteville has committed to achieving a 40 percent waste diversion rate and reducing the city's per capita waste going to the landfill by 5 percent by 2030 (City of Fayetteville 2024).

GHG AND CO-POLLUTANT EMISSIONS REDUCTION OR SEQUESTRATION

The implementation of a waste minimization and management program, including the sequestration of carbon into compost and/or carbon-negative processes such as biochar pyrolysis, has the potential to have a significant impact in meeting the sustainability goals outlined in this plan.

Because significant amounts of waste are produced from construction and demolition in this rapidly growing region, there will be an ample source of materials to convert into biochar for the foreseeable future. A significant reduction of CH4 emissions from the local landfill could be accomplished by diverting food waste and other organic material to composting programs, biochar pyrolysis facilities, anaerobic digester facilities, and BECCS facilities. Improving the capture of recyclable materials through an MRF would also have an indirect impact on GHG emissions in the industrial sector by reducing the GHG footprint associated with the extraction, distribution, and manufacture of raw materials by replacing a portion of these with recycled materials. However, it should be noted that burning CH4 derived from the anaerobic digestion process for fuel only delays the emission of this GHG, without reducing it. Any CH4 leaked from the anaerobic digestion process will have higher short-term impact on the climate when compared to other GHGs such as CO2. Therefore, a life cycle analysis (LCA) of a planned anaerobic digestor should be developed to make sure it isn't exacerbating the emission of GHGs in the region.

Incorporating locally produced biochar into the soils of pastures and croplands in NWA could increase carbon sequestration of these lands by an additional 30,000 metric tons of carbon per year (Hardin and Ims 2024). Other opportunities for carbon sequestration with biochar in NWA include its incorporation into compost for use in urban greening projects. The City of Fayetteville, for example, produces 4.3 million pounds of compost each year. If a mixture of 20 percent biochar and 80 percent soil were added to this compost, then approximately 1,584 tons of CO2 could be sequestered annually through the Fayetteville composting program alone (Carbon Chicken Project LLC 2024b).

Solid waste originating in Fayetteville alone generated more than 93,000 metric tons of CO2 in 2022 (City of Fayetteville staff, personal communication, 2023). In May 2023, Waste Management (WM) opened a renewable natural gas (RNG) facility at the Waste Management Eco Vista landfill in Tontitown. This landfill gas-to-energy facility uses the GHG emissions generated from the decomposition of organic material in the landfill, recovering and distributing approximately 750,000 metric million British thermal units (MMBtu) per year at this RNG. This figure is the equivalent of more than 5.1 million gallons of diesel, which is enough to serve the equivalent of 25,000 households annually or 650 heavy-duty vehicles (Gatling 2023). Because of the need for regional alternatives to the Waste Management Eco Vista landfill, additional RNG facilities associated with landfills and wastewater treatment facilities in the region may provide an opportunity to reduce GHG emissions while simultaneously providing an alternative fuel source that can partially replace the use of fossil fuels.

AUTHORITY TO IMPLEMENT

A waste minimization and management program could extend incentives to several different entities. If such a program were to be implemented to pursue this measure, it is anticipated that the eligible entities would be a state agency or a coalition of local governments and/or regional organizations. This program would be structured in a manner to assure that the eligible entity or coalition would have the authority to implement one or more components of this measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. Voluntary use and public perception of innovative waste management programs could be a barrier to implementing this measure in certain instances and for certain projects; therefore, public outreach and education will be important for the successful implementation of this measure.

ANTICIPATED WORKFORCE NEEDS

The waste and recycling industry requires a diverse range of skills and expertise to design, develop, and operate these facilities. Professionals with backgrounds in engineering, project management, environmental science, and other technical expertise would be in high demand. Organizations that oversee program implementation would also have procurement and oversight responsibilities. In addition, field services will be needed to construct and install these systems. Overall, implementation of this measure is anticipated to result in an increase in demand for workers and an associated need for workforce development, which should have a positive impact on the economy in NWA.

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

A waste minimization and management innovation program would be structured in a manner that benefits LIDAC and rural populations, such as by improving access to waste collection services for rural communities and job creation in low-income communities. Such a program could be structured in a manner that meets the desires and needs of the population served and would focus on providing equitable outcomes through its incentive programs.

Carbon Removal Sector

In addition to GHG emission reduction efforts, natural carbon sinks such as forests, wetlands, and prairies play a crucial role in absorbing and storing CO2 from the atmosphere. The results of the public and stakeholder engagement and regional GHG analysis indicate that increasing carbon sequestration in natural lands could be achieved through the following measure:

Develop and implement a program(s) to improve or increase carbon sequestration on the landscape through nature-based solutions by:

1. **Planting native tree and plant species that provide optimal carbon sequestration benefits in publicly owned parks, trails, rights-of-way, and privately owned lands.**
2. **Restoring degraded prairies, forests, riparian buffers, streams, and wetlands in parks, trails, rights-of-way, and private lands.**
3. **Identifying lands with a high carbon sequestration value or that are suitable for the development of new parks or recreation areas, and creating programs for the protection and restoration of these lands through fee-simple acquisition and/or conservation easements.**
4. **Developing conservation plans for new parks and recreation areas that include measures to improve or preserve areas with high carbon sequestration value.**

Progress in this sector could be monitored with updated GHG emissions data, or with metrics such as comparing and quantifying land cover changes in NWA periodically. The cost of implementing these measures varies by initiative.

RATIONALE FOR MEASURES

Because it is the 15th-fastest growing region in the U.S. (Sparkman 2023), development in NWA is happening at an astonishing pace. Historically, the region was dominated by native prairies and forests. However, much of the original forests were logged or cleared, and the native prairies have either been developed or converted to pastures.

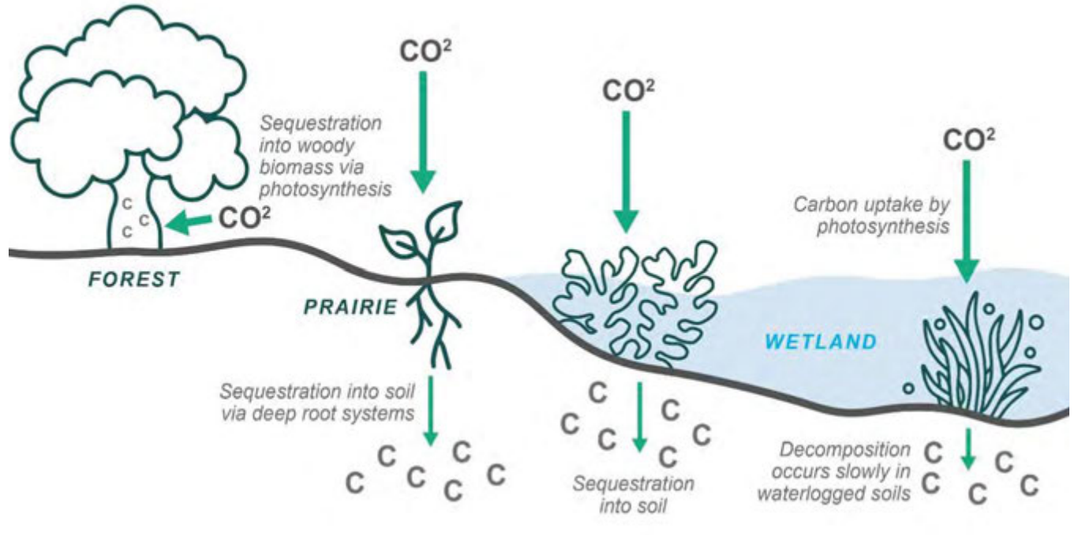
Today, NWA is still home to **significant natural areas that were responsible for sequestering approximately 2,677,944 metric tons of CO_2 in 2020, equivalent to approximately 30 percent of the region's GHG emissions. Forests and pastures in NWA provided a combined 84 percent (2,256,677 metric tons) of the total sequestration for the region in 2020.**

However, the effectiveness of these carbon sinks can be compromised by factors like deforestation and environmental degradation. To leverage these natural carbon sinks and achieve net-zero emissions by 2050, it is essential to implement strategies that protect and restore these ecosystems. A program to improve or increase carbon sequestration through land conservation and acquisition could mitigate some of the loss of carbon storage in the region because of this rapidly occurring development. Support is present in NWA for this type of program, which is made evident by the results of the public survey and stakeholder engagement.

FORESTS
sequestered
30%
of the region's
GHG emissions.

Land conservation and acquisition could also provide additional benefits such as improving access to parks and open space for LIDACs where such amenities are currently lacking. Additionally, preserved and restored

Figure 7. Carbon Sequestration.



lands could enhance connectivity within the active transportation network in NWA, improving mobility choice for those who lack vehicular transportation. Where these efforts are implemented along riparian areas, additional benefits could also include improvements to stormwater management such as flood control and a reduction in contaminants entering the Illinois River, Beaver Lake, and their tributaries. These benefits can be realized by continuing to create a NWA Green Network of interconnected green corridors and trails that follow major streams and rivers and link natural areas and open spaces throughout the region.

FORESTS + PASTURES
sequestered
84% of the region's
GHG emissions.

Forests

Plants with large amounts of woody biomass, such as trees, are ideal for aboveground carbon sequestration and storage (Nowak 1993; Nowak and Crane 2000, 2002; McPherson et al. 2005). However, there is a limit to how much carbon upland forests can store because of the limits to both the life span and sizes to which trees are able to grow (Zhu et al. 2018; Forrester 2020). Furthermore, because of the space constraints in urban settings, urban trees are better suited for climate adaptation measures that help city residents cope with climate change, such as urban heat islands and flooding, than for climate and pollution mitigation measures that aim to reduce GHG emissions. As a nature-based climate mitigation measure, carbon sequestration and storage by forests is more effective when implemented on large spatial areas where the trees can be maintained for a long period of time (Pataki et al. 2021), rather than in space-constrained urban settings. Therefore, the protection of existing forests and other high-carbon storing ecosystems is a more effective alternative for a nature-based solution approach to climate mitigation (Forrester 2020).

Prairies

Prairies are landscapes dominated by nonwoody herbaceous vegetation; grasslands contain approximately 12 percent of the world's terrestrial carbon stocks mostly occurring as belowground biomass. The fibrous root systems of most prairie vegetation species can extend several meters below the surface, often making up between 60-80 percent of the biomass carbon in these ecosystems (Ontl and Janowiak 2017). The soils beneath upland prairies can sequester more carbon than what is found in both the aboveground biomass and belowground soils of upland forests, combined. Soil carbon in prairie ecosystems appears to be related to plant biodiversity and the species richness of these landscapes (Chen et al. 2018; Yang et al. 2019; Pastore et al. 2021). It's estimated that NWA was once covered by 100,000 acres of prairie as recent as the late 1800s before being mostly converted to fields and pastures (Environmental Consulting Operations 2024).

The remnants of these prairies can still be seen in the remaining relict nabkha mounds that were created centuries or millennia ago (Seifert et. al. 2009). Many remnant nabkha mounds still remain in pastures and fields in NWA; their presence indicates that these areas have had little to no soil disturbance over the past several centuries. They likely still retain a seedbank consisting of native prairie species, making them ideal for prairie restoration efforts. Where these mounds are absent, restoration would require extensive seeding and/or planting of native species.

Woolsey Wet Prairie in Fayetteville, which also contains relict nebkha mounds, was similarly restored by implementing a multiyear burn regimen that reduced nonnative vegetation species and promoted native species over time. Today, Woolsey Wet Prairie is home to 496 different species of plants, many of which germinated from the seed bank, including 11 species that are considered rare and had not been seen at the site for many decades (City of Fayetteville 2021). Therefore, restoring pastures, especially those already containing nabkha mounds, to prairie ecosystems offers one solution for sequestering carbon in the region.

Wetlands

Wetlands act as a carbon sink by first removing carbon from the atmosphere through photosynthesis and storing it in the plant's biomass. Later, after the plant completes its life cycle, the plant dies and falls to the surface of the soil. The anoxic conditions created by saturated and inundated soils supports anaerobic bacteria, which decompose organic material at a much slower rate than aerobic bacteria. In fact, the rate at which new organic material is deposited to these saturated/inundated soils exceeds the rate at which the anaerobic bacteria can decompose this material. The result is an accumulation of organic material, creating a carbon sink (Mitsch and Gosselink 2015; Richardson and Vepraskas 2001). However, natural wetlands in NWA are usually too small or are not inundated or saturated for a long enough duration during the growing season to provide significant carbon sequestration and storage benefits. Wetland creation and restoration efforts in the region could have cobenefits of reducing flooding, improving stormwater quality, improving groundwater recharge, and mitigating drought.

GHG SEQUESTRATION

Among CO2 removal methods, nature-based carbon removal methods are most readily scalable. Immediate upscaling is crucial to maximize their carbon storage potential. Ecosystem carbon accumulation takes time – trees planted today will sequester carbon for decades. Other ecosystems, like prairies and wetlands, continuously sequester carbon and won't saturate within relevant timescales if left undisturbed (Field and Mach 2017; Oxford Net Zero 2024).

A study published in 2017 in the Proceedings of the National Academy of Sciences estimated that nature-based carbon removal can account for up to 37 percent of the carbon sequestration needed to keep average global temperatures from increasing 2 degrees Celsius by 2030 (IPBES 2019) and up to 20 percent of the carbon sequestration needed to keep average global temperatures from increasing 2 degrees Celsius by 2050 (Griscom et al. 2017). If we assume that 30 percent of the GHG emissions of the region in 2050 could be offset by carbon removal through conservation and restoration efforts, a land acquisition and conservation program could be combined with the GHG emission reduction strategies outlined above to reach net-zero GHG emission goals by that time.

It should be emphasized that nature-based carbon removal methods are long-term investments, not quick fixes to reach net-zero goals. They require substantial land, water, and time to achieve carbon saturation. Though older trees store more carbon, their sequestration capacity declines with age, and carbon can be rapidly lost as a result of disturbances. Carbon removal methods with short storage times or high disturbance risks (e.g. from development or natural hazards) are unsuitable for

offsetting GHG emissions. For more stable carbon stores, approaches that induce the release of GHGs (like CH4 and NO2) risk negating their benefits. If these effects partially offset sequestration, additional carbon removal is necessary to compensate (Zickfeld and Canadell 2023).

Reaching net zero will require both minimizing emissions and enhancing carbon removal in the region's ecosystems. Minimizing emissions from ecosystems must include the following:

- Protect existing ecosystems and their carbon stores by reducing ecological loss and degradation.
- Increase ecosystem resilience to minimize emissions released as a result of disturbances like natural hazards (Wiedinmyer and Hurteau 2010).

Enhancing natural carbon removal can be accomplished through the restoration, management, and creation of new ecosystems. Though afforestation is crucial, other ecosystems like wetlands and prairies are vital and deserve attention as well (Zickfeld and Canadell 2023; Seddon et al. 2020).

Creating ecosystems with low resilience leads to unstable carbon stores. Therefore, carbon removal efforts should focus on creating natural systems that are ecologically resilient to environmental stressors and other natural hazards (e.g., drought, pests). These efforts include planting diverse, stress-tolerant native species instead of monocultures or nonnative species (Oxford Net Zero 2024).

To optimize carbon removal efforts through a land conservation and acquisition program, prioritizing the restoration of prairies in NWA would likely provide the greatest long-term benefit with regard to carbon removal, followed by the restoration of forests, riparian buffers, and wetlands respectively.

Forest restoration efforts would consist of preservation of these areas, and/or the removal of invasive species, coupled with the planting of native species that enhance the carbon sequestration value of these areas. Stream restoration efforts would be concentrated along stream corridors and would consist of activities similar to those for forested areas. Vegetation removal would be restricted to nonnative species, and/or shrubs, saplings, and understory trees with a diameter at breast height (DBH) less than 8 inches.

During restoration activities, priority should be given to using plant species that provide optimal carbon sequestration and storage. For trees, this includes native species with more than one of the following characteristics:

- Naturally long-lived so that carbon will be stored for a longer period of time
- Producing large quantities of woody biomass so that more carbon will be stored than would be in a species that produces less woody biomass (Nowak 1993; Nowak and Crane 2000, 2002; McPherson et al. 2005)
- Fast growth rate so that more carbon can be sequestered in a shorter amount of time than a slower-growing species (Enquist 2002)
- Large crowns and/or large leaf sizes so that photosynthetic activity and removal of carbon from the atmosphere would be optimized

Herbaceous species that provide optimal carbon sequestration and storage include the following characteristics:

- Long-lived perennial species can store carbon for a longer period and can sequester more carbon over time than short-lived species,
- Fibrous root systems will sequester a greater amount of carbon into the soil than species with tap root systems.
- Deep root systems will sequester carbon deeper into the soil than shorter root systems.
- Warm-season grasses can sequester a significantly greater amount of carbon into their belowground biomass than cool-season grasses because of their higher rates of photosynthesis and efficient water use (Fornara and Tilman 2008; Spiesman et al. 2018).
- Warm-season grasses growing in combination with legumes that sequester atmospheric nitrogen have been shown to increase the rate of capture and storage of carbon into the soil (Yang et al. 2019).

A list of native woody and herbaceous species that provide optimal carbon sequestration can be found in **Appendix D**.

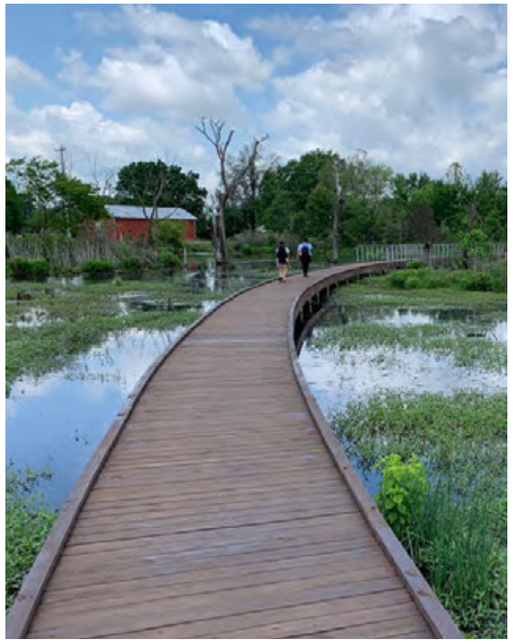
Rewetting wetlands is a much more effective strategy than wetland/peatland creation that can take much longer and still not store equivalent amounts of carbon and nitrogen to older wetlands/peatlands (Beardmore 2023).

AUTHORITY TO IMPLEMENT

A land conservation and acquisition program could extend incentives to several different entities, including state agencies or a coalition of local governments and/or regional organizations. This program would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of this measure directly and/or deliver incentives to individuals and entities that could implement components of this measure. The availability of land for purchase or acquisition could be a barrier to implementing this measure in certain instances and for certain projects.

ANTICIPATED WORKFORCE NEEDS

A carbon removal program would require a diverse range of skills and expertise to design, develop, and operate this program. Professionals who have backgrounds in natural resources, land management, project management, environmental science, and other technical expertise would be in high demand. Organizations that oversee program implementation will also have procurement and oversight responsibilities. In addition, field services will be needed to implement this program. Overall, implementation of this measure is anticipated to result in an increase in demand for workers and an associated need for workforce development, which should have a positive impact on the economy in NWA.



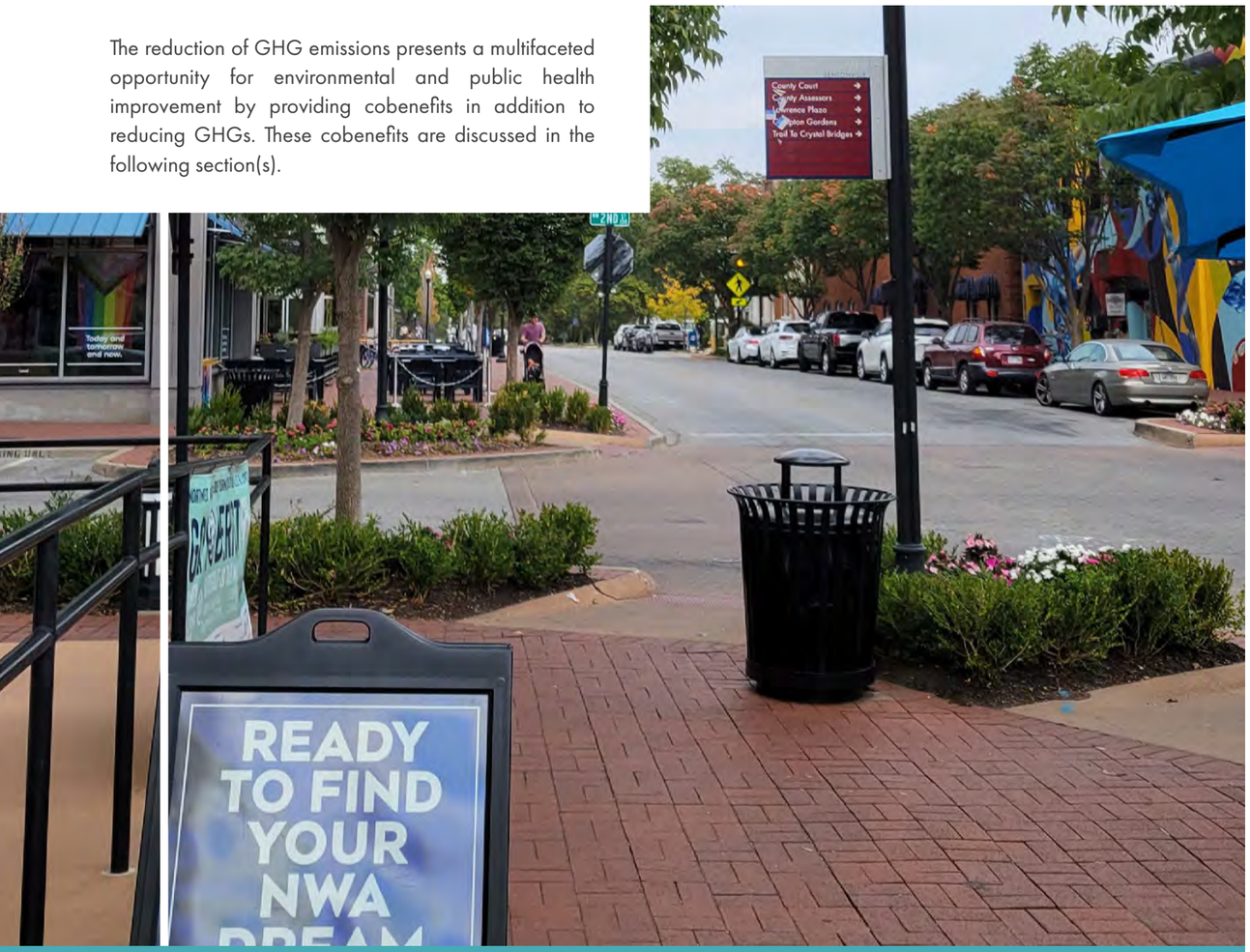
LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS

A land conservation and acquisition program would be structured in a manner that prioritizes incentives for LIDAC and rural populations. Because the majority of LIDAC census tracts are located in rural parts of NWA where opportunities for carbon removal from conservation efforts are more abundant, additional benefits with a land conservation and acquisition program could include improving access for LIDACs to parks and open space where such amenities are currently lacking. Lands acquired for conservation or restoration could improve connectivity for the regional active transportation network and provide access to this network for residents of LIDACs and access to parks or open spaces for those who lack vehicular transportation. Additional benefits of implementing land conservation and acquisitions along riparian areas could include improvements to stormwater management and flood reduction for LIDAC and rural populations living downstream of these improvements. This program would be structured in a manner that meets the desires and needs of the population served and would focus on providing equitable outcomes with its incentive programs.

07

Cobenefits for Northwest Arkansas

The reduction of GHG emissions presents a multifaceted opportunity for environmental and public health improvement by providing cobenefits in addition to reducing GHGs. These cobenefits are discussed in the following section(s).



Air Quality

By reducing GHG emissions, NWA can simultaneously lower the levels of co-pollutants like particulate matter, nitrogen dioxide, and ozone, as well as hazardous air pollutants (HAPs) such as benzene and mercury. This synergistic effect results in cleaner air, reduced exposure to harmful pollutants, and a consequent improvement in public health outcomes. Consequently, public health benefits are expected, including a decrease in respiratory and cardiovascular diseases (e.g., asthma, chronic obstructive pulmonary disease [COPD], heart attacks, strokes), reduced premature mortality, particularly among vulnerable populations, and an overall improvement in quality of life. Cleaner air allows for greater participation in outdoor activities and reduces symptoms like coughing and shortness of breath. Therefore, policies targeting GHG reduction offer a dual benefit, addressing both air quality and public health concerns.

GROUND LEVEL OZONE

Reducing GHG emissions significantly decreases ozone-forming pollutants, such as nitrogen oxides (NOx) and volatile organic compounds (VOCs). This helps mitigate ground-level ozone, a potential emerging issue in NWA. Ground-level ozone can harm human health and affect sensitive vegetation and ecosystems. The EPA sets the National Ambient Air Quality Standards (NAAQS) for ground-level ozone, which specifies a maximum allowed measurement for ozone to be present in outdoor air. In 2015, the EPA set the NAAQS for ground-level ozone at 0.070 parts per million (ppm), measured as the fourth-highest daily maximum 8-hour concentration averaged across three consecutive years. The Arkansas Department of Energy and Environment (ADEE) DEQ maintains an Ambient Air Monitoring Station in Springdale, which indicated that in 2023 the ground-level ozone levels in our region exceeded the limits set by the EPA that year.

Ground-level ozone is created when NOX react with other VOCs in the atmosphere as they are exposed to sunlight. NOX are highly reactive gases that form when fossil fuels are burned at high temperatures. NOx pollution is emitted from a variety of sources, including automobiles, trucks, construction equipment, power plants, and industrial boilers. Thus, reducing emissions from fossil fuels through the measures outlined above is likely to provide a cobenefit of reducing the levels of NOX and ground-level ozone in the region.

The EPA and ADEE's DEQ have been working to reduce ozone concentrations in Arkansas. High temperatures accelerate the production of ozone, complicating efforts to improve air quality in the region (USEPA 2016). High temperatures are also accompanied by weak winds, causing the atmosphere to stagnate and ozone levels to accumulate (Burrows 2016).

Water Quality

Reducing GHG emissions can safeguard and improve water quality in the region. By transitioning to cleaner energy sources, NWA can minimize the release of air pollutants like nitrogen and sulfur oxides, which contribute to nutrient runoff that degrade our rivers, lakes, and streams. Minimizing nutrient runoff helps protect aquatic ecosystems from eutrophication and harmful algal blooms, ultimately safeguarding our drinking water supplies and recreational opportunities. Furthermore, reducing emissions can help stabilize weather patterns, minimizing the risk of extreme events like severe droughts, floods, and intense storms that can contaminate water sources, increase erosion, and degrade water quality. By prioritizing GHG reduction, we can assure a more resilient water system for our region, protecting public health, supporting aquatic ecosystems, and safeguarding this vital resource for future generations.

Stormwater and Flooding

Excessive amounts of stormwater runoff from heavy precipitation events can exceed the capacity of gray infrastructure, resulting in flash flooding and negative impacts to the residents of NWAs (Boyett and Lee 2022; Early 2021). Many of the carbon removal measures will help the region adapt to these heavier precipitation events through preserving or enhancing stormwater infiltration into the soil and the restoration of natural infrastructure that provides flood control, such as wetlands and riparian buffers along streams. Riparian buffers help slow stormwater runoff and improve the absorption of flood waters, which reduces peak flows and lessens downstream flooding.

Waste Reduction

The need to address NWA's near-capacity landfill necessitates a focus on GHG reduction measures that directly affect waste generation. By prioritizing waste prevention and minimization, we can significantly reduce the volume of material entering the landfill, delaying its closure and mitigating environmental risks. This effort includes implementing strategies such as the following:

- **Maximizing waste diversion:** Actively promoting and expanding existing programs for composting, recycling, and reuse while exploring innovative waste reduction initiatives like pay-as-you-throw programs and food waste prevention campaigns.
- **Supporting the circular economy:** Fostering local markets for recycled materials and encouraging businesses and residents to adopt circular economy principles, emphasizing repair, reuse, and remanufacturing.
- **Investing in waste-to-energy infrastructure:** Exploring the potential for developing safe and environmentally sound waste-to-energy technologies that can generate renewable energy while minimizing environmental impacts.

By implementing these strategies, we can not only reduce the pressure on our landfill, but also significantly contribute to our region's GHG reduction goals. This approach aligns with sustainable waste management practices and assures a more resilient and environmentally responsible future for the NWA community.

Economic and Health Benefits

Many of the measures described above have economic and health cobenefits. For example, transportation mode shift has both economic and health benefits for the residents of NWA that are associated with active transportation. In 2018, a study commissioned by the Walton Family Foundation was conducted to analyze the economic benefits of bicycling in NWA. The study found that the bicycling industry generates $137 million in benefits annually (BBC Research & Consulting 2018). A similar study conducted in 2022 by the Center for Business and Economic Research at the Sam M. Walton College of Business found that **the bicycling industry generated $159 million in total economic impacts from cycling-related jobs, tourism revenue, and taxes in NWA** that year (Jebaraj 2023).

A 2019 study concluded that switching from short car trips to walking or bicycling can achieve substantial health gains and health care cost savings, and that implementing infrastructural improvements to encourage active transportation is likely to be a cost-effective way to improve the overall health of the population (Mizdrak et. al. 2019).

A reduction in GHG and ground-level ozone will provide additional health cobenefits by reducing diseases related to poor air quality in the region. Ground-level ozone aggravates lung diseases, such as asthma, and increases the risk of premature death from heart or lung disease. Certain people such as children, the elderly, the sick, and the poor are especially vulnerable (EPA 2016).

BICYCLING INDUSTRY

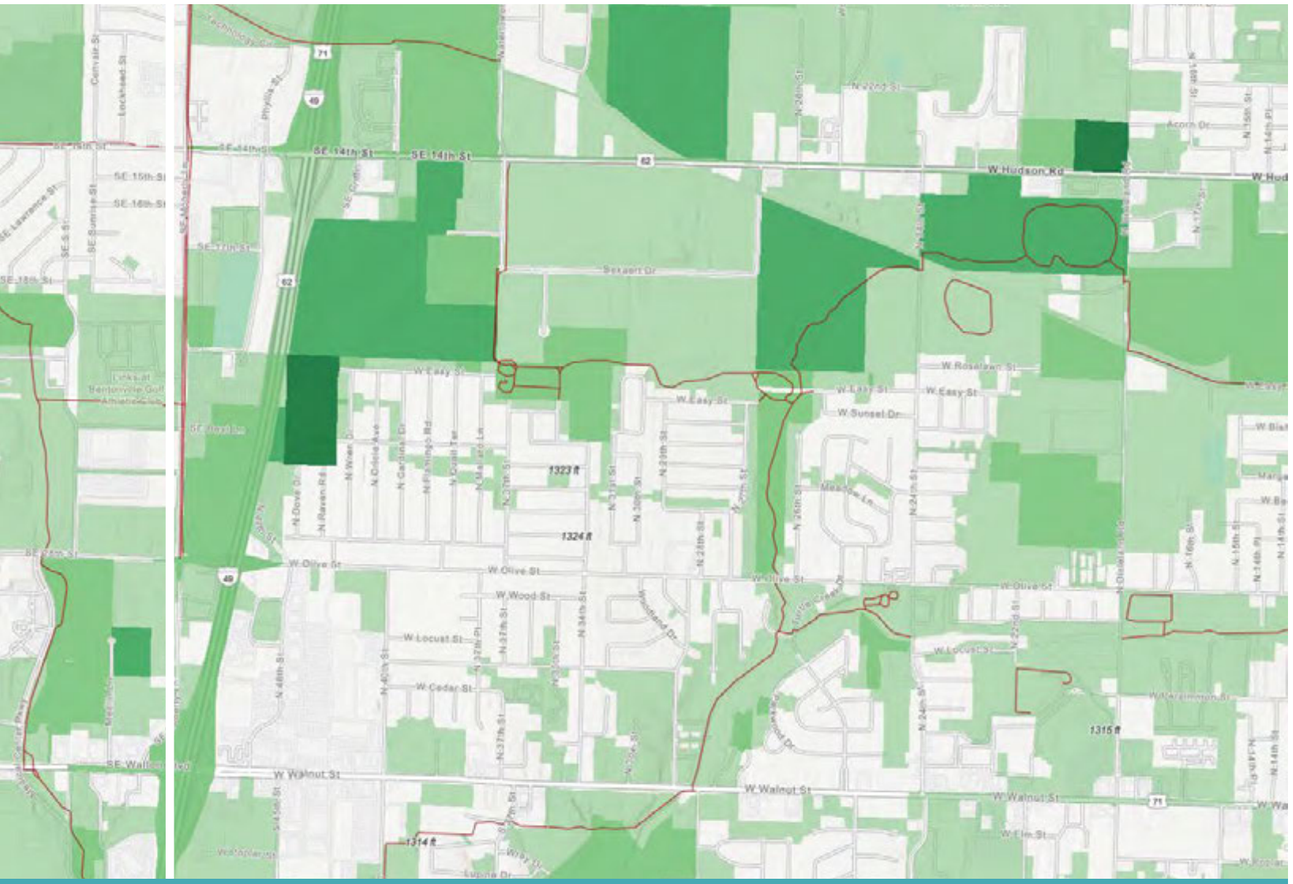
(cycling-related jobs, tourism revenue, and taxes)

$159 MILLION

in total economic impacts.

08

Nature-Based Solutions Mapping Tool



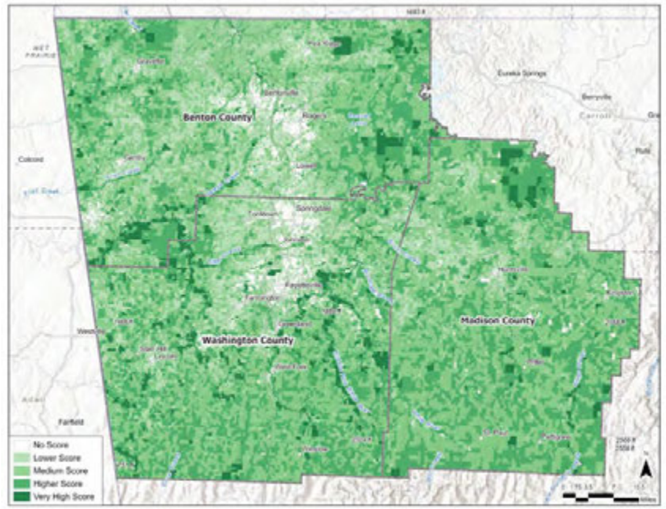
NWA, rich in natural resources, is well-positioned to proactively implement nature-based solutions for environmental protection and enhanced quality of life. A key initiative supporting this effort is the Nature-based Solutions Mapping Tool, a new, innovative online platform providing comprehensive, parcel-level analysis developed collaboratively with project stakeholders.

Each parcel in Benton, Madison, and Washington counties is scored based on its capacity to provide nature-based solutions, considering factors like ecosystem services, ecological resilience, carbon sequestration and storage, and social equity. This analysis identifies potential opportunities for continuing to create an NWA Green Network of interconnected green corridors and trails that follow major streams and rivers, linking natural areas and open spaces throughout the region to facilitate a shift to active transportation modes, enhance carbon removal, mitigate flooding, and improve water quality in the region.

This innovative online platform empowers policymakers, planners, and community members to understand the location, distribution, and condition of NWA's natural infrastructure. Users should leverage this tool to:

- **Inform land-use planning decisions:** Visualize the ecological value of individual parcels to identify areas best suited for conservation, restoration, or development.
- **Evaluate the environmental impact of proposed projects:** Assess how proposed projects might affect ecosystem services, ecological resilience, and social equity for more informed decision-making.
- **Prioritize investments in green infrastructure:** Guide investments in parks, trails, and other projects to maximize their impact on sustainability and community well-being.
- **Engage community members:** Serve as a resource for education and engagement, fostering a shared understanding of natural assets and promoting collaborative stewardship.

Ultimately, this tool supports data-driven decision-making, enabling NWA to strategically leverage its natural assets for a more sustainable and resilient future. It facilitates informed decisions regarding the protection, restoration, and enhancement of these vital resources, and the prioritization of sustainable development strategies that improve both environmental and social well-being. Detailed information about the tool's methodology and the results of the geospatial analysis can be found in **Appendix E**.



09

Conclusion

The NWA EEI CAP represents a pivotal step towards a sustainable and resilient future for the region. By acknowledging the interconnected challenges facing NWA – from transportation and stormwater management to waste disposal and outdoor recreational access – this plan offers a comprehensive and collaborative roadmap for action. The voluntary measures and GHG reduction targets outlined in this document, coupled with the innovative GIS Mapping Tool, empower local communities, organizations, and individuals to contribute to a shared vision.

This plan is not merely a collection of strategies; it is a framework for building a region where economic prosperity, environmental stewardship, and social equity thrive in harmony. Crucially, regular monitoring and adaptive management will be essential to address evolving dynamics and safeguard the plan's continued relevance and effectiveness. The NWA EEI CAP provides the framework; its success hinges on the collective commitment and actions of those who call NWA home as the region adapts and refines its approach moving forward. By embracing the principles and strategies within this plan, and remaining responsive to change, NWA can secure a vibrant and thriving future for generations to come.

Recommendations

To achieve the vision outlined in this plan, the following key actions are recommended:

- **Prioritize sustainable transportation:** Implement strategies to improve public transit, expand active transportation options, and promote equitable access to transportation resources.
- **Enhance stormwater management:** Invest in green infrastructure, improve existing stormwater systems, and promote water reuse strategies to mitigate flooding, erosion, and water pollution.
- **Advance waste reduction and circularity:** Implement comprehensive recycling and composting programs, promote waste diversion, and support initiatives that foster a circular economy.
- **Protect and enhance outdoor recreational resources:** Balance recreational demand with ecosystem protection, ensure equitable access to natural areas, and address habitat fragmentation and pollution.
- **Foster regional collaboration:** Encourage interjurisdictional cooperation, engage stakeholders across all sectors, and promote information sharing to maximize the impact of sustainability initiatives.
- **Prioritize social equity:** Ensure that sustainability efforts benefit all residents, particularly low-income and disadvantaged communities, by addressing environmental justice concerns and promoting equitable access to resources and opportunities.
- **Embrace adaptive management:** Regularly monitor progress, evaluate the effectiveness of implemented strategies, and adapt the plan as needed to respond to changing conditions and emerging challenges.
- **Implement and track projects:** Identify and implement specific projects that enact the measures outlined in this plan, establish a management system to track these projects, and monitor their progress to determine effectiveness.
- **Update the GHG inventory:** Conduct comprehensive updates of the regional GHG inventory every 5-10 years to track progress and inform future planning.
- **Maintain and update the Nature-based Solutions GIS Mapping Tool:** Periodically update the Nature-based Solutions GIS Mapping Tool and document the results of the geospatial analysis in a report that compares new parcel scores to the 2025 baseline year to track changes in natural infrastructure.
- **Conduct a carbon storage study:** Conduct a study to establish a baseline for carbon stored in natural areas of NWA and track GHG emissions resulting from the clearing of forests and disturbance of wetlands and prairie soils related to infrastructure development.

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